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ABSTRACT

This report presents an overview of teacher supply and demand in the state of Maryland. Section I provides a description of the national debate about teacher shortages and raises the question of where imbalances in the supply and demand for teachers exist and how they may be rectified. In section II, the general purposes of the study are presented and analyzed, and the format of the report is outlined. The broad purposes of the study are to provide shortage information to the Maryland State Board of Education, provide teacher staffing information to educational policy makers, and to contribute to national efforts to collect supply and demand data. The third section presents a detailed account of the methodology that was used for the study. In section IV, the results of the study are discussed. Five shortage areas are identified: special education, mathematics, physical sciences, industrial arts, and trades and industry. The final section contains recommendations on courses of action that are directly implied by imbalances between supply and demand, and courses of action that are preventive in nature, based upon trend data appearing in the report. Data from the study are presented in tables. (JD)

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TEACHER

SUPPLY and DEMAND

in

MARYLAND

1987–1990

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Prepared by
MARYLAND STATE DEPARTMENT of EDUCATION
and
MARYLAND STATE BOARD for HIGHER EDUCATION

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Prepared by

MARYLAND STATE DEPARTMENT OF EDUCATION

Teacher Education and Certification Branch
Division of Certification and Accreditation

Research, Evaluation and Statistical Services Branch
Office of Management Information Systems

and

MARYLAND STATE BOARD FOR HIGHER EDUCATION

September 1987

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EXECUTIVE SUMMARY

TEACHER SUPPLY AND DEMAND IN MARYLAND

Since 1984, the Maryland State Board of Education has annually declared teaching fields of "critical shortage" so that state scholarship money may be directed toward those fields.

In 1985 and 1986, a study of teacher supply and demand in Maryland was conducted jointly by the Maryland State Department of Education and the Maryland State Board for Higher Education. The results of those studies were presented in reports to the State Board to assist them in their declaration of critical shortage fields. The scope of the 1986 report was considerably broader than that of the 1985 report. It included a consideration of supply sources from outside as well as from within the state. It also considered the possible long term impact of demographic trends and educational policies on teacher supply and demand in Maryland.

In response to interest among educators, legislators and the general public, this year's report maintains the broad focus of last year's report, and adds several new dimensions. The report presents a brief overview of the dialogue about teacher supply and demand, and discusses its relevance to Maryland.

Section I provides a description of the national debate about teacher shortage, and concludes that arguing for or against the existence of teacher shortages is a glass-half-full glass-half-empty type of argument. A more appropriate question is raised by this report: where are there "imbalances" in the supply and demand for teachers in the state of Maryland, and how may those imbalances become balanced?

In Section II of the report the general purposes of the study are presented and analyzed for the reader, and the format of the report is outlined. The broad purposes of this study are:

(A) Provision of shortage information to the State Board of Education to assist them in their declaration of "critical shortages" for scholarship purposes, (B) provision of teacher staffing information to educational policy makers in Maryland, and (C) contributions to national efforts to collect supply and demand data.

Section III provides a detailed account of the methodology which was used for this study. "The Maryland Model" is a method of predicting supply and demand on the basis of projecting the number of available new hires from five supply sources and comparing that figure with personnel directors' estimates of their demands for teachers. The model is an appropriate one for a "teacher import" state like Maryland.

In Section IV, the results of the study are discussed, and five shortage areas are identified. This year, the shortages are: Special Education, Mathematics, Physical Sciences (Physics, Chemistry, Earth Science, General Science), Industrial Arts, and Trades and Industry. It is recommended that the certification fields of Early Childhood Education and Social Studies be observed closely in the near future because some imbalances in supply and demand were observed during this year's study.

In Section V, two kinds of recommendations are made: (1) Courses of action which are directly implied by imbalances between supply and demand, and (2) courses of action which are preventive in nature, based upon trend data which appear in the report. Those recommendations include:

(A) Continued recruitment activities which target the critical shortage areas mentioned in Section IV;

(B) Increased collaboration among school systems and between school systems and the Maryland State Department of Education on a statewide job bank for teacher candidates, advertisement of Maryland as a place to teach, support of future teachers' organizations in middle schools and high schools, outreach projects for retirees and career changers who might consider second careers in teaching and continued exploration of the impact of strategies such as higher salaries and incentives on the availability and satisfaction of teachers for Maryland schools;

(C) Cooperation with other states on national data collection activities;

(D) The collection of systematic data on certain categories of specialists and therapists and the analysis of the need for scholarship support for those areas;

(E) The aggressive recruitment of qualified minority candidates to teach in Maryland school systems.

TABLE OF CONTENTS

LIST OF TABLES ii

LIST OF FIGURES iii

I. INTRODUCTION: THE DEBATE 1

II. PURPOSES AND FORMAT 10

Purposes 10

Format 13

III. THE MARYLAND MODEL 15

Supply 16

Demand 20

IV. RESULTS 34

V. RECOMMENDATIONS 38

1. Imbalances in Supply and Demand 38

A. Recruitment of Non-Traditional Candidates 39

B. Increased Collaboration among Local School Systems and between Local School Systems and the Maryland State Department of Education 40

C. Cooperation with Other States and National Agencies on Data Collection Activities 41

2. Special Issues 42

A. Age and Retirement Rates of Teachers 42

B. Specialists -- Need Areas Not Covered by Scholarship Legislation 43

C. Early Childhood Teachers for Pre-Kindergarten Programs 47

D. NTE Qualifying Scores 47

E. The Recruitment of Minority Candidates 49

CONCLUSION 51

REFERENCES 52

TECHNICAL SUPPLEMENT 54

LIST OF TABLES

TABLE 1	Teacher Supply/Demand by Field and Region	5
TABLE 2	1986-87 Actual vs. Projected New Teachers Hired by Certification Area	21
TABLE 3	Retirees by LEA - 1985-86 and 1986-87	44
TABLE 4	1986-87 Retirees by Certification Area	45
TABLE 5	New Teachers Hired by Certification Area 1986-87	T.S.1a
TABLE 6	Supply and Demand Projections 1987-88	T.S.1b
TABLE 7	Supply and Demand Projections 1988-89	T.S.1c
TABLE 8	Supply and Demand Projections 1989-90	T.S.1d
TABLE 9	Anticipated Demand for New Teachers	T.S.2a-b
TABLE 10	Supply of New Teachers - Graduates of Maryland's Teacher Education Programs	T.S.3a-b
TABLE 11	Supply of Maryland Teacher Education Graduates By Race	T.S.4
TABLE 12	Teacher Salaries for 1986-87 and 1987-88	T.S.5
TABLE 13	NTE Qualifying Scores for Maryland	T.S.7
TABLE 14	Termination Cause by Certification Area 1986-87	T.S.8
TABLE 15	Number and Percent of Students and Teachers by Race Maryland Public Schools (1986-87)	T.S.10

LIST OF FIGURES

FIGURE 1	A Comparison of Recommendations in the Holmes Group, Carnegie Task Force, and National Governor's Association 1986 Reports on Teaching	8
FIGURE 2	Teacher Supply and Demand Model for Maryland	18
FIGURE 3	New Teachers Hired During 1986-87 by Type of Experience	19
FIGURE 4	Profile of Beginning Teachers: 1986-87 by Institution and Residence	25
FIGURE 5	1986-87 Actual vs. Projected New Teachers by Certification Area	26
FIGURE 6	Teaching Staff by Type of Degree (1986-87)	28
FIGURE 7	Teaching Staff by Type of Certificate (1986-87)	29
FIGURE 8	Total 1986-87 Teaching Staff-Age by Race	30
FIGURE 9	Total 1986-87 Teaching Staff-Years Experience by Race	31
FIGURE 10	NTE Core Battery Tests-- 1986-87 No-Fault Passing Rates	T.S.6
FIGURE 11	Causes of Termination Among Teaching Staff (1986-87)	T.S.9

TEACHER SUPPLY AND DEMAND IN MARYLAND (1987)

I. INTRODUCTION: THE DEBATE

During the past year, the dialogue about teacher supply and demand has sparked a great deal of controversy. References to teacher shortages have appeared in scholarly literature, policy reports, and in the press. The most vocal participants in the dialogue are representatives of the National Education Association and its affiliates, representatives of the federal government (Office of Education and the Department of Labor), and C. Emily Feistritzer, the director of the National Center for Education Information, a private corporation.

In the press, the dialogue appears in simple, absolute terms: Is there a shortage or not? Unfortunately, the answer to that question is neither simple nor absolute. The answer to the question of teacher shortage is similar to the parable about the blind man and the elephant or the answer to the question: Is the glass half full or half empty?

The National Education Association sees the glass as half empty. In a recent report, presented at its 125th Annual Meeting in Los Angeles (July 1987), NEA researchers found that over 40% of the school districts which they surveyed used "emergency" teaching certificates to hire people who have not received formal training as teachers. A large number (almost 39%) of the districts, admitted to assigning teachers to classes which were outside of their major fields of preparation. In other words, individuals without a significant amount of college coursework in mathematics were being assigned to teach high school math courses, and individuals without a "major" in English were assigned to teach high school English courses. Perhaps the most startling

finding of the NEA study is the fact that almost half of the large (i.e., 25,000+ enrollment) districts which participated in the study relied upon substitute teachers, teacher aides, and interns to act as classroom teachers, a practice which is deplored by professional educators and the public at large.

On the other hand, the federal government and C. Emily Feistritzer see the glass as half full. In the Department of Labor's Bureau of Labor Statistics' Occupational Outlook Quarterly (1986), a labor economist claims that there is no teacher shortage nor is there likely to be one between now and 1995. Emily Feistritzer, in her report, Teacher Crisis: Myth or Reality? (1986), agrees that no shortage has materialized nor is one likely to develop in the near future. Feistritzer's report was followed by a survey in June 1987 in which "...teacher placement officers around the country reported no shortages of qualified applicants." According to Feistritzer, those placement officers "...expect to have all teaching positions filled when school opens next fall" (Teacher Education Reports, v.9, #14, July 16, 1987).

The heated debate between the NEA and its supporters and Emily Feistritzer and her supporters has been fueled by the heavy press coverage which newspapers have provided for the combatants. The Washington Post, for example, provided space for editorials by Mary Futrell, President of NEA and C. Emily Feistritzer (December 1987). The NEA also purchased advertising space to rebut Feistritzer's claims.

Several analyses of teacher supply and demand which have been conducted by other agencies and individuals have received less publicity. Nonetheless, some of these lower-profile reports have presented persuasive evidence that the glass is both half full and half empty. Linda Darling-Hammond of the Rand Corporation characterizes the NEA-Feistritzer debate as a "schoolyard

argument," and presents her own dispassionate analysis of teacher supply and demand. In an article which appeared in Education Week (May 13, 1987), Darling-Hammond declares that a "...simple 'yes' or 'no' answer to the question of how severe teacher shortages are and what they really mean" does not exist. She clarifies the glass-half-full position by citing the following statistics:

" * (Only) 2% of teaching vacancies in 1983-84 were left unfilled (half of these were in central cities, which had a shortage rate four times higher than other districts);

* (Only) 12.4% of new hires were uncertified in that year (1983-84);

* most states report shortages in (only) science, mathematics, foreign languages, and special education."

On the other hand, the glass-half-empty believers counter with the following data:

" * On average, only about 75% of those trained to teach...enter teaching; ...the number of college students is expected to decline slightly over the next several years.

* Huge increases in the share of graduates going into teaching are unlikely because competition among occupations for college graduates will increase to fill the six million new professional and technical jobs anticipated for the next decade.

* The potential reserve pool available to teaching has already been depleted in the past few years."

Darling-Hammond concludes the article with a plea to analysts to "present as thorough a picture as can be mustered and to gather information that is not influenced by "the politics of teacher shortage."

Two of the recent reports on teacher supply and demand which seem to transcend the political debate are: A Study of Certified Teacher Availability in the States, Joanne Capper, (The Council of Chief State School Officers --

February 1987), and Good Teachers: An Unblinking Look at Supply and Preparedness (The National School Boards Association, 1987).

In this report, which addresses the related issues of teacher supply and demand, teacher recruitment, and teacher preparedness (i.e., teacher education and certification requirements), the National School Boards Association (NSBA) report includes the following factors as contributing to the decline in the number of available teachers:

> "* a low salary as compared with other professions open to new college graduates;
>
> * a societal lack of respect for the teaching profession;
>
> * growing professional opportunities for women and minorities, many of whom formerly chose teaching as a career because opportunities for them in other fields were few." (p.8)

The report also discusses the problem of high attrition rates for new teachers. One of the most useful of the many tables displayed in the NSBA report is a presentation of teacher supply and demand by teaching field and by region of the United States. The table (figure 6 of the NSBA report, Table 1 of this report) comes from the Association for School, College and University Staff's (ASCUS) Tenth Annual Teacher Supply/Demand Survey, January 1986). The teaching fields of greatest shortage in the Mid-Atlantic region correspond very closely with the teaching fields of critical shortage which were declared in Maryland last year as a result of the 1986 report on Teacher Supply and Demand in Maryland.

The NSBA report explores in detail the supply of teachers in urban and rural districts, shortages in subject areas, and the implications of the Holmes Group, Carnegie Task Force, and National Governors' Association reports

TABLE 1

Teacher Supply/Demand by Field and Region

Field	Region: Alaska	Hawaii	1 North-West	2 West	3 Rocky Mtns.	4 Great Plains /Midwest	5 South Central	6 South-East	7 Great Lakes	8 Mid-Atlantic	9 North-East
Agriculture	—	3.00	4.00	2.57	3.00	3.08	3.00	3.00	4.00	4.00	3.00
Art	2.00	2.00	1.86	1.81	2.08	2.17	2.40	2.53	2.26	2.00	2.50
Bilingual Ed.	3.00	2.00	4.29	4.74	4.50	4.24	4.63	3.45	4.27	3.58	4.14
Business	4.00	4.00	3.50	3.46	2.90	2.74	2.76	2.90	3.39	3.82	3.75
Computer Science	3.00	4.00	4.14	4.25	4.44	4.00	4.39	4.28	4.27	4.21	4.29
Counselor-Elem.	3.00	5.00	3.57	2.25	2.95	3.42	3.14	2.95	3.23	2.60	3.14
Counselor-Sec.	3.00	5.00	3.63	2.45	3.05	3.15	2.86	2.90	3.43	2.94	2.78
Data Processing	3.00	3.00	3.67	3.67	3.88	3.96	3.69	4.07	3.97	4.56	4.67
Driver Ed.	3.00	1.00	1.75	2.50	2.00	2.21	2.71	2.69	2.67	2.33	3.00
Elementary-Primary	3.00	1.00	2.38	3.58	3.00	2.29	3.58	2.79	2.30	2.61	2.85
Elementary-Intermediate	3.00	1.00	2.25	3.58	3.18	2.38	3.54	2.96	2.44	2.61	3.00
English	2.00	4.00	3.00	3.84	3.25	3.17	3.33	2.79	3.23	3.38	3.36
Health Education	4.00	2.00	1.63	2.29	1.60	1.59	2.29	2.13	1.90	1.77	2.63
Home Economics	2.00	1.00	2.25	2.25	2.38	2.31	2.38	2.31	2.73	3.50	3.00
Industrial Arts	2.00	5.00	3.50	2.83	3.20	2.78	3.55	3.67	3.09	4.33	5.00
Journalism	3.00	2.00	2.14	3.06	3.11	3.00	2.80	2.93	3.10	2.40	4.00
Language, Mod.-French	3.00	4.00	3.00	2.92	3.20	3.26	3.16	3.83	3.61	3.11	3.80
Language, Mod.-German	3.00	3.00	3.00	2.79	3.45	3.30	2.83	3.80	3.57	2.83	3.25
Language, Mod.-Spanish	3.00	4.00	3.57	3.96	3.73	3.43	3.22	3.95	3.88	3.21	3.50
Library Science	4.00	3.00	3.80	3.54	3.78	2.84	3.62	3.60	3.50	3.33	3.00
Mathematics	3.00	5.00	4.13	4.84	4.58	4.24	4.75	4.64	4.65	4.48	4.70
Music-Instrumental	4.00	1.00	4.21	3.27	3.91	3.29	2.88	2.68	3.21	2.61	3.13
Music-Vocal	4.00	1.00	3.71	2.71	3.55	3.18	2.59	2.62	3.04	2.44	3.13
Physical Education	2.00	1.00	1.17	1.86	1.67	1.25	2.24	1.86	1.48	1.60	1.43
Psychologist (school)	4.00	—	3.60	2.84	3.17	3.75	3.20	3.50	3.69	3.36	3.25
Science-Biology	2.00	5.00	2.63	4.19	3.00	3.58	3.78	4.12	3.37	3.93	3.60
Science-Chemistry	2.00	5.00	3.63	4.48	4.17	4.25	4.39	4.56	4.52	4.31	4.70
Science-Earth	3.00	5.00	3.00	4.08	3.45	3.72	4.22	4.08	3.71	4.08	3.89
Science-General	3.00	5.00	3.00	4.17	3.25	3.64	4.05	4.04	3.82	3.92	3.89
Science-Physics	2.00	5.00	3.50	4.57	4.46	4.24	4.41	4.56	4.62	4.44	4.67
Social Sciences	3.00	1.00	1.86	2.28	1.91	1.91	2.27	1.71	2.18	2.50	2.56
Social Worker (school)	—	—	2.50	3.00	2.38	2.82	2.67	2.83	3.06	2.60	2.50
Speech	3.00	1.00	2.43	2.92	3.09	2.39	2.64	3.00	2.70	2.70	4.00
Spec.-Deaf Education	3.00	4.00	3.50	3.50	4.43	3.67	4.00	4.00	3.52	3.50	3.40
Spec.-ED/PSA	3.00	4.00	4.14	4.20	4.67	4.13	4.17	4.29	4.37	3.79	3.89
Spec.-Gifted	3.00	3.00	3.29	3.43	4.00	4.12	4.13	4.28	3.94	3.55	3.71
Spec.-LD	3.00	4.00	3.86	4.30	4.78	4.15	4.30	4.50	4.31	3.77	3.88
Spec.-MR	3.00	4.00	4.00	4.29	4.67	3.85	4.26	4.27	4.00	3.68	3.94
Spec.-Multi. Handi.	3.00	4.00	4.00	4.40	4.67	4.21	4.25	4.47	4.28	3.94	3.94
Spec.-Reading	3.00	3.00	3.17	3.06	3.89	3.44	3.91	4.00	3.36	3.20	3.00
Speech Path./Audio.	3.00	—	3.50	3.67	4.44	4.22	3.71	4.27	4.26	4.00	4.33
COMPOSITE	2.95	3.16	3.15	3.44	3.43	3.18	3.45	3.49	3.42	3.34	3.47

KEY: 5 = Considerable, 4 = Some Shortage, 3 = Balanced, 2 = Some Surplus, 1 = Considerable Surplus

Source: Association for School, College and University Staff, *Tenth Annual Teacher Supply/Demand Survey*, January 1986

(1986) on the supply of teachers. Those recommendations are displayed in NSBA's Table 1, found on page 5.

The study which was conducted for the Council of Chief State School Officers by Dr. Joanne Capper is a scholarly approach to the development of a needs assessment instrument which is usable by every state and the provision of "a nationwide picture" of needs in math, science and foreign language. The summary findings of Dr. Capper are listed below.

"Summary Findings (pp. 1 & 2)

1. Across 11 math, science and foreign language subject areas in 29 states, 15,127 teachers, or 9 percent, are teaching out of field in the 11 subject areas surveyed.

2. Subjects with the greatest percentages of uncertified teachers are: General Science - 18 percent, Earth Science - 17 percent, Physics - 15 percent, and Latin - 11 percent.

3. Over 26,000 sections, or 5 percent, of mathematics, science and foreign language classes are being taught by uncertified teachers.

4. An estimated 520,180 students in 25 states are being taught mathematics, science and/or foreign language by a teacher uncertified in the subject.

5. Few courses are offered in languages other than French, German, Latin and Spanish. In fact, the number of courses of all other languages combined is 330 as compared with 392 for Latin and 264 for German.

6. When the number of teachers newly certified in 1985 is compared with the number of teachers needed to fill class sections taught by uncertified teachers and those teachers expected to retire in 1985, there is a surplus of certified teachers available in eight of eleven subjects.

7. When the number of newly certified teachers is adjusted to reflect the 34 percent who do not ultimately teach, shortages of certified teachers appear in six of eleven subject areas, ranging from shortages of 12 certified teachers in French to 493 in Mathematics.

8. When the number of newly certified teachers is further adjusted to reflect the estimated annual teacher-turnover rate of five percent, all eleven subject areas show shortages of certified teachers, ranging from a shortage of 3,932 teachers in Mathematics to 68 in All Other Languages. These figures are the most accurate with regard to availability of certified teachers.

9. The percent of newly hired teachers that are uncertified is three to nine percent greater than the percent of teachers teaching that are uncertified. The range of percents for new hires is from five to 21 percent and for teachers teaching is from 5 to 18 percent.

10. Across the 23 states submitting new hire data, approximately 35 to 50 percent of new hires in mathematics and science are directly from teacher training programs; 15 to 37 percent did not teach the previous year, and only 7 to 17 percent are from out of state.

FIGURE 1

A Comparison of Recommendations in The Holmes Group, Carnegie Task Force and National Governors' Association 1986 Reports on Teaching

"Tomorrow's Teachers" The Holmes Group	"A Nation Prepared" The Carnegie Task Force	"Time for Results" National Governors' Association
Organization of Schools		
Make schools better places for teachers to work and learn	Restructure schools to provide a professional environment for teaching	Redesign the organization of schools to create more productive working and learning environments
Organization of the Teaching Profession		
Recognize differences in teachers' work	Restructure the teaching force; introduce a new category of lead teacher	Redesign the structure of the teaching career
Teacher Salaries		
	Make teachers' salaries and career opportunities competitive with those of other professions	Improve teacher compensation at entry and throughout the career
Teacher Incentives/Student Performance		
	Relate incentives for teachers to school-wide student performance, and provide schools with technology services and staff essential to teacher productivity	Align teacher incentives with school-wide student performance
Teacher Professional Standards		
Create standards of entry into the profession.	Create a National Board for Professional Teaching Standards	Create a national board to define teacher standards
Teacher Education		
Make the education of teachers intellectually more solid	Require a bachelors' degree in Arts & Sciences as a prerequisite for the study of teaching	Rebuild the system of teacher education
Connect schools of education with public schools	Develop a new professional curriculum in graduate schools of education leading to a master in teaching degree	Define the body of professional knowledge and practice that teachers must have
Teacher Recruitment		
	Mobilize the nation's resources to prepare minority youngsters for teaching careers	Recruit able teacher candidates
		Improve teacher mobility (through transferable state licenses & credit for teaching in other districts)
State Regulation of Schools		
		Establish a "loose/tight" approach to state and local regulation of schools
		Establish the concept of educational bankruptcy (which gives states the power to intervene in the operation of failing local school districts)

These figures support the conventional wisdom that there is a substantial pool of teachers available that are not currently teaching. There are some regional differences in the proportions of new hires from the various sources."

Note that the findings relate to teacher preparation (i.e., certification and training) as well as to teacher staffing (i.e., supply and demand). Many researchers agree that it is impossible to separate the issues of quality and quantity in discussing teacher supply and demand.

The following report will emphasize teacher staffing and will provide only a brief discussion of teacher preparation issues (e.g., teacher testing) as they affect the supply of qualified teachers for Maryland schools.

II. PURPOSES AND FORMAT

Purposes.

The purposes of this study may be divided into the following categories: (1) provision of teacher staffing information to the Maryland State Board of Education in order to facilitate the declaration of teaching fields of critical shortage and geographic areas of extraordinary shortage; (2) provision of teacher staffing information to other policy makers in the state to facilitate their operations; (3) contributions to national efforts to collect data which reveal patterns and trends in teacher supply and demand.

The specific purposes are listed below under each of the categories:

A. Provision of Shortage Information to the State Board of Education

Fulfillment of these purposes will help the State Board of Education to make significant policy decisions about areas such as scholarship assistance, teacher recruitment, teacher certification, and teacher education. The report will meet these purposes by providing the following:

1. Presentation of an accurate picture of position vacancies and supply sources for new teachers for the state of Maryland;

2. Presentation of a valid report of the 1987 graduates of teacher education programs in Maryland;

3. Projections of vacant teaching positions for the next two years (1988, 1989);

4. Recommendations of teaching fields which should be considered "critical shortage" areas in order to qualify for state scholarship support;

5. Recommendations of school systems which should be considered "geographic areas of extraordinary shortage" (i.e., school systems which are characterized by chronic shortages) in order to qualify for state scholarship support;

6. Discussion of issues related to teacher certification and teacher recruitment which affect teacher supply and demand (e.g., the availability of minority teacher candidates, the effects of teacher testing programs, and the extent of out-of-field teaching in Maryland schools)

B. **PROVISION OF TEACHER STAFFING INFORMATION TO EDUCATIONAL POLICY MAKERS in MARYLAND.**

The fulfillment of these purposes will help policy makers in local school systems and in institutions of higher education to direct and adjust their recruitment, hiring, and assignment procedures to meet the needs of the future. The report will meet these purposes by providing the following:

1. Description of the demographic characteristics (e.g., age, gender, race) of the present teaching pool and projections of the median ages of Maryland teachers for the next few years;

2. Comparison of demographic characteristics of Maryland teachers with certain salient characteristics of pupil enrollment (i.e., the number of pre-retirement age teachers

in certain teaching fields compared with enrollment trends for the near future);

3. Presentation of the relative number of ethnic minority pupils in Maryland school systems with the number of ethnic minority teachers in those systems;

4. Description of the number of 1987 graduates of institutions of higher education by teaching field;

5. Discussion of issues such as teacher testing and out-of-field teaching and their projected impact on the supply and demand of qualified teachers for Maryland schools.

C. **CONTRIBUTIONS TO NATIONAL EFFORTS TO COLLECT SUPPLY AND DEMAND DATA.**

Meeting these purposes will permit Maryland educators to participate in nationwide efforts to attract and retain the most qualified individuals as teachers. This report will meet these purposes by providing the following:

1. Descriptions of the unique characteristics of the Maryland pool of teachers and teacher candidates;

2. Predictions of trends in teacher supply and demand which may affect other states or the profession as a whole;

3. Discussion of the extent to which national patterns, trends, or predictions about teacher staffing are accurate for Maryland.

Format.

This report is divided into five major sections: I. Introduction, II. Purposes and Format, III. the Maryland Model, IV. Results, and V. Recommendations. The authors have adopted that format because of the nature of research reports like this one which are written with policy purposes in mind. They must be concise, clearly stated, and well grounded in research and current trends. Therefore, Section I provides an overview of the current situation and a small sampling of relevant research papers and reports. The documents which are cited in Section I are representative of the broad range of perspectives, opinions, and ideas about teacher supply and demand.

Section I outlines the purposes of the report in terms of its various constituencies or stakeholders. The purposes are divided into three functional categories for the convenience of the reader. Section II concludes with an explanation of the format of the report, describing each of the sections in detail.

Section III presents the "Maryland Model" of teacher supply and demand. It defines terms, delineates the methodology, and sets forth the assumptions and rationale upon which Maryland's approach to teacher supply and demand are based.

Section IV presents the results of the investigation. This section identifies the anticipated vacancies which were reported by local school systems this year and makes projections for the next three years. This section

presents data and interpretations of data which relate to vacancies in teaching positions and anticipated sources of supply. It also presents a discussion of demographic trends and policy issues which may affect teacher supply and demand in Maryland.

Section V provides an in-depth analysis, synthesis, and evaluation of the results which are reported in Section IV, and highlights policy areas which require closer attention. Included in Section V are recommendations for teaching fields of "critical shortage" and geographic areas of "extraordinary shortage."

III. THE MARYLAND MODEL.

In this year's report, the Maryland Model depends on three sources of information to identify the supply and demand of teachers:

1. the Staff Reporting System/Certification database;

2. a survey of local personnel directors asking them to project anticipated demand for staff; and

3. a survey of Maryland institutions of higher education requesting projections of Maryland teacher education graduates.

The number of newly hired teachers for the 1986-87 school year was obtained from the Staff Reporting System/Certification database. Local school systems report annually to the Maryland State Department of Education an individual record of each person employed in their school systems, from superintendents to bus drivers. Corresponding certification data are maintained by the Maryland State Department of Education on an ongoing basis for everyone who is issued a Maryland teaching certificate.

For newly hired, experienced teachers (defined as In-state experienced pool and Out-of-state experienced pool), the database records when and where they last taught and their years of teaching experience. For inexperienced or beginning teachers, it records the Maryland institution where they received teacher training (for the in-state pipeline) or the state where they attended college (for the out-of-state pipeline). Data on beginning teachers also include the individuals' state of residence. In addition to new data, the database contains race, sex, age, highest degree obtained, certification area, and the annual salary for every teacher employed in Maryland.

Supply.

The five sources of supply which are reported in this study are: (1) beginning teachers who are recent graduates of Maryland institutions of higher education, (2) beginning teachers who are recent graduates of out-of-state institutions of higher education (3) experienced teachers from Maryland who are returning to teaching after a period of time during which they held non-teaching jobs or worked "in the home," (4) experienced teachers from out-of-state who have been teaching in other states and/or have returned to teaching after working at non-teaching jobs; and (5) returning staff from the previous year. Categories #3 and #4 do not include teachers who have been teaching in Maryland and who transferred (without a break in service) from one Maryland school system to another system. Therefore, supply sources may be considered "real." Figure 2 on the following page is a graphic representation of the Model.

Maryland's approach to supply and demand is somewhat different from that which is used by other states, such as North Carolina or Ohio, because of the nature of Maryland's teacher hiring patterns. Maryland, unlike those states, is a "teacher import" state. It has historically sought and hired a large proportion of its new teachers from other states. In 1985-86, for example, only 16% of the new teachers which were hired by Maryland school systems were graduates of Maryland institutions of higher education. Only 13% of the new hires in that year were experienced teachers who resided in Maryland when they were hired. Approximately 20% of the new hires during that year were recent graduates of institutions of higher education outside of Maryland. A large number of experienced teachers were hired from other states. This year, the percentage of the experienced new hires who came from out-of-state was

approximately 30%. Figure 3 indicates that 23.7% of the new hires were experienced public school teachers from other states. Approximately 6% of them were experienced, non-public school teachers from other states. Figure 4 indicates that 28.6% of the beginning teachers who were hired last year were "out-of-state" residents who graduated from out-of-state institutions. About 19% of the beginners were Maryland residents who graduated from out-of-state institutions. Given the dependence of Maryland's teacher recruiters upon supply sources outside of Maryland, any model of supply and demand which ignores the out-of-state pool of teacher candidates is not helpful to policy makers or others who seek to anticipate staffing needs for Maryland schools.

One of the reasons why Maryland schools depend heavily upon outside sources of supply is that the yearly number of graduates of teacher education programs at Maryland institutions of higher education is typically much smaller than the yearly number of new teachers which are needed by Maryland school systems. Furthermore, less than half of those graduates choose to teach in Maryland. Some of them do not go into teaching at all, and others elect to teach in other states. Thus, Maryland's teacher recruiters seek large numbers of applicants from states like Ohio where the number of graduates of teacher education programs generally outstrips the number of new teachers which are needed by Ohio school systems.

In states like North Carolina, graduates of teacher education programs within the state are a fairly reliable source of supply because many of them choose to stay in North Carolina to teach ("Teacher Supply and Demand in North Carolina Public Schools, 1986-95"). Teacher supply and demand in that state is somewhat simpler to assess. In an "import state" like Maryland, however, a more complex model is required. Therefore, the four sources of new supply are considered.

TEACHER SUPPLY AND DEMAND MODEL FOR MARYLAND

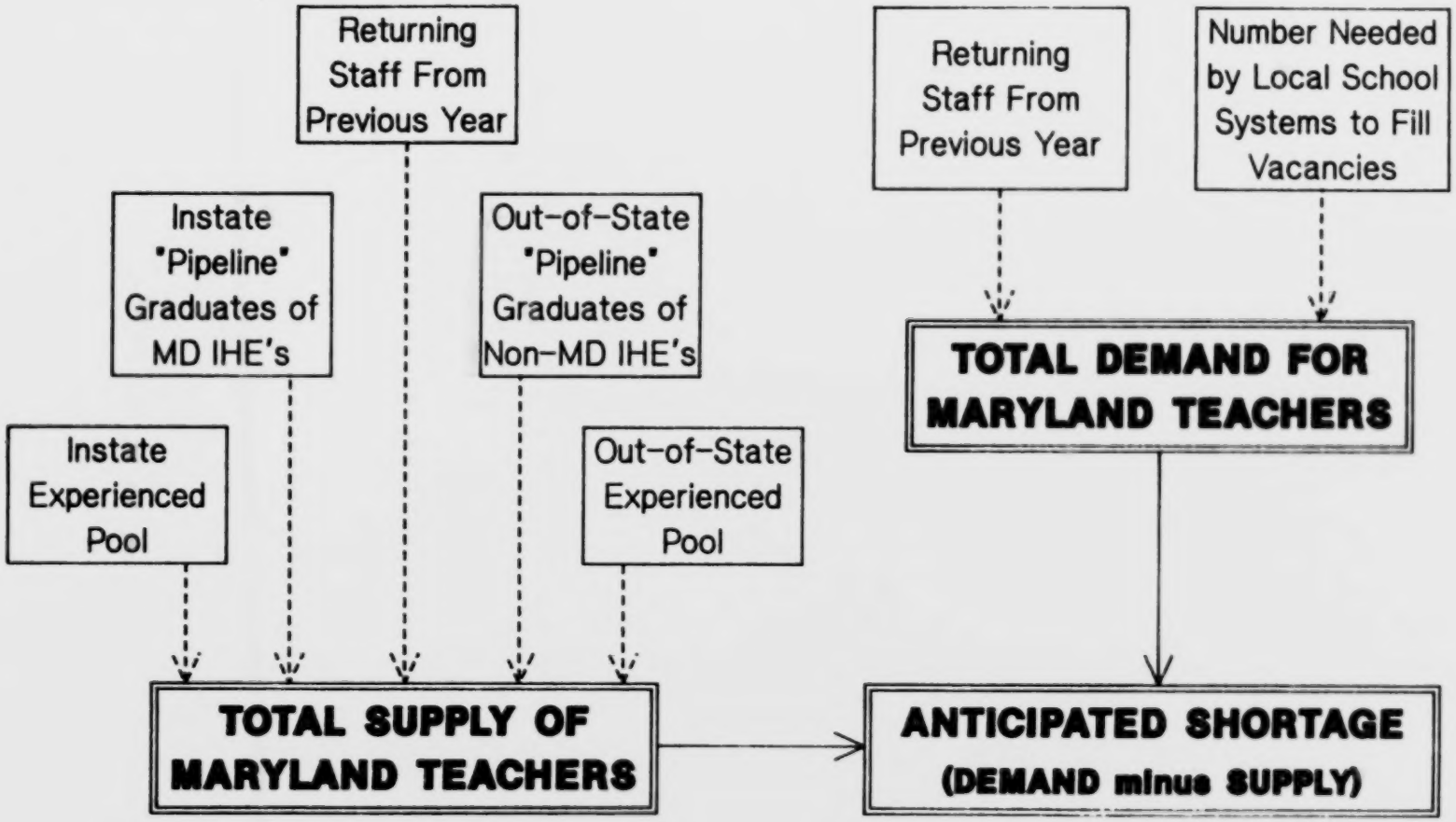
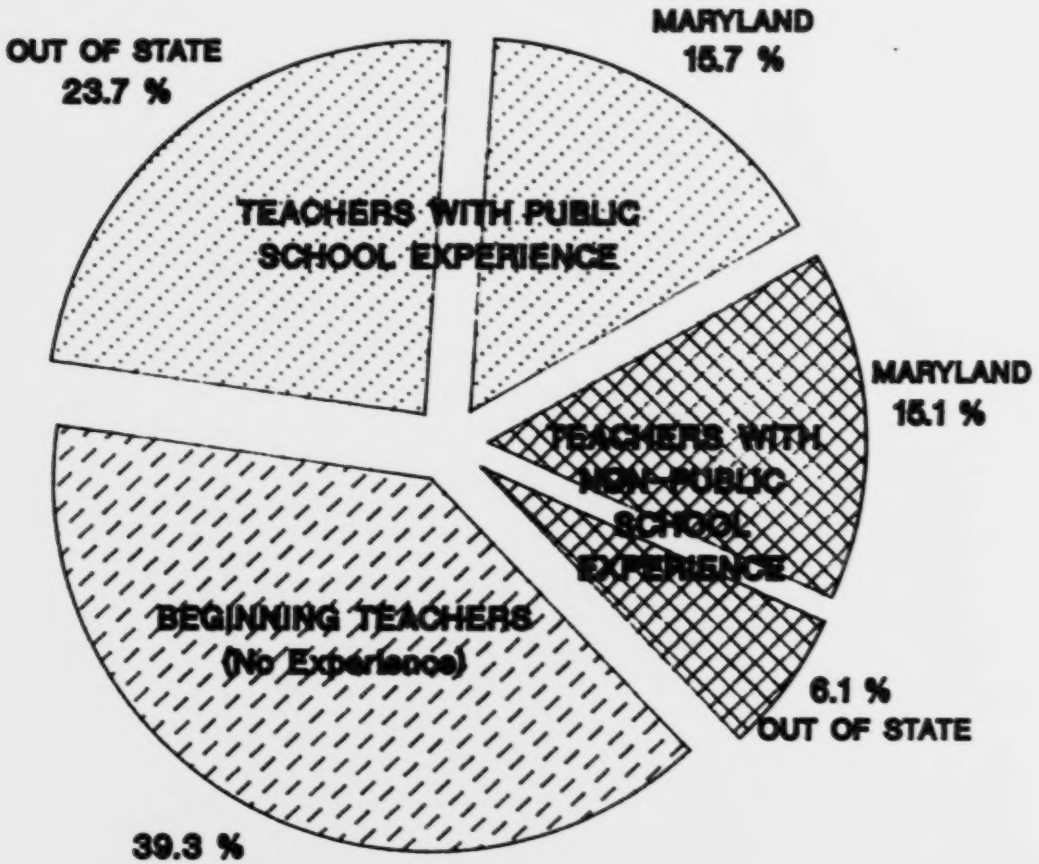

Returning Staff From Previous Year
Instate "Pipeline" Graduates of MD IHE's
Out-of-State "Pipeline" Graduates of Non-MD IHE's
Instate Experienced Pool
Out-of-State Experienced Pool
TOTAL SUPPLY OF MARYLAND TEACHERS
Returning Staff From Previous Year
Number Needed by Local School Systems to Fill Vacancies
TOTAL DEMAND FOR MARYLAND TEACHERS
ANTICIPATED SHORTAGE (DEMAND minus SUPPLY)

FIGURE 2

NEW TEACHERS HIRED DURING 1986-87
BY TYPE OF EXPERIENCE



TOTAL NUMBER = 2,722

FIGURE 3

Demand.

In assessing "demand" for new teachers in Maryland public schools, a survey form was submitted to the personnel directors of each local school system, requesting estimates of projected vacancies by teaching field. Although some states like North Carolina infer teacher demand from pupil enrollment statistics which are supplied by school systems, the Maryland Model relies heavily upon the judgment of personnel officers of local school systems. In the past, these estimates have been fairly accurate. In last year's report, for example, the estimates of position vacancies which were provided by personnel directors in the spring of 1985 were only about 9% different, cumulatively, from the actual number of vacancies which appeared in Maryland school systems during the 1985-1986 school year. Improvements in reporting procedures should minimize those differences by school year 1988-89.

According to Table 2, which presents the projected and actual hires by teacher certification area for 1986-87, demand projections which were provided in the spring of 1986 were considerably higher (21%) than the actual hiring which took place during the 1986-87 school year. A number of factors may have contributed to that difference. One possible hypothesis is that teacher recruiters may not have been able to find as many qualified teachers as they needed to fill their projected vacancies. Therefore, only 2722 of the 3299 new teachers which were needed were hired. Another interpretation of that discrepancy is the hypothesis that publicity about teacher shortages caused personnel directors to inflate estimates of demand. A third hypothesis is

TABLE 2
ACTUAL VS. PROJECTED NEW TEACHERS HIRED
BY CERTIFICATION AREA: 1986-87

Certification Area	Actual 1986-87	Projected* 1986-87	Actual Minus Projected	Percent Difference
Total	2,722	3,299	-577	-.21
Art	74	78	-4	-.05
Business	26	58	-32	-1.23
Elementary Education	1,279	1,260	-19	-.01
English	171	218	-47	-.27
Foreign Language	76	121	-45	-1.59
Health/Physical Education	86	86	0	0
Home Economics	23	36	-13	-.56
Industrial Arts	15	36	-21	-2.40
Mathematics	86	198	-112	-1.30
Music	106	119	-13	-.12
Science	104	184	-80	-.77
Social Studies	96	148	-52	-.54
Special Education	263	608	-345	-1.31
Trades and Industry	8	56	-48	-6.00
Other Area	82	93	-11	-.13
Not Specified	227	-	-	-

*Source: LEA Directors of Personnel

that the methods used by school system personnel officers for assessing demand are inadequate. If the discrepancy between 1985 projections of demand and actual (1985-86) hiring (9%) is compared with the discrepancy between 1986 projections of demand and actual (1986-87) hiring (21%), the methods which local units are using to project demand is becoming less accurate. Perhaps, this trend is the result of the complex and changing nature of teacher staffing.

Note in Table 2 that for five of the six critical shortage areas in 1986, the projected number of vacancies was significantly greater than the actual number of new hires. In Special Education, for example, projections were off by 131%. In Trades and Industry (600%), Mathematics (130%), Industrial Arts (240%), and Business Education (123%). The discrepancies between projections and actual hires appear to be significant. In Science, the sixth critical shortage area on last year's list, the discrepancy is somewhat smaller than for the others, but that may be explained by the fact that "Science" on Table 2 includes Biological Science, which is not a shortage area for Maryland, as well as Physics, Chemistry, Earth Science, and General Science, which <u>were</u> shortage areas last year. The other teaching area which was over-projected, according to Table 2, was Foreign Languages, a field which was a critical shortage area in 1984 and 1985.

According to a recent National Research Council publication which reports on a study conducted by the Panel on Statistics on Supply and Demand for Precollege Science and Mathematics Teachers, the Committee on National Statistics, the Commission on Behavioral and Social Sciences and Education, and the Committee on Indicators of Precollege Science and Mathematics Education, there

are several state and national models for assessing demand. That publication reports on California and Colorado in the West, Illinois in the Midwest, New York in the Northeast, and Florida and South Carolina in the South. Those six states were selected on the basis of their geographic region, trends in elementary school enrollment over the past decade, level of current elementary school enrollment, and percentage of private school enrollment.

In California, the demand for teachers is estimated by dividing projected enrollments by pupil-teacher ratios. In Colorado, demand is also estimated by applying a pupil-teacher ratio to projected numbers of pupils. In Illinois, there is no formal process for generating projections of teacher supply or demand. However, state officials report annually on the composition of the certification pool and new hires by grade level and subject area. In New York, teacher demand is calculated by a seven-step method:

(1) Enrollment by grade level is projected using a combination of birth cohort survival rates and grade retention rates;

(2) Total teacher demand is estimated by applying projected staffing rates to the enrollment projections;

(3) Preliminary subject area teacher demand is estimated by applying subject area staffing ratios to subject area enrollments;

(4) These preliminary figures for subject area teacher demand are adjusted to the control totals computed in step 2;

(5) Projections of the number of continuing teachers are made by applying historical subject area teacher retention rate distributions to the base year teacher age distribution;

(6) Projected new teacher hires, by subject area, are taken to be the difference between total teacher demand (from step 4) and teacher retention (from step 5);

(7) New teacher hires are distributed between newly certified teachers and returning teachers by using historical data on hires.

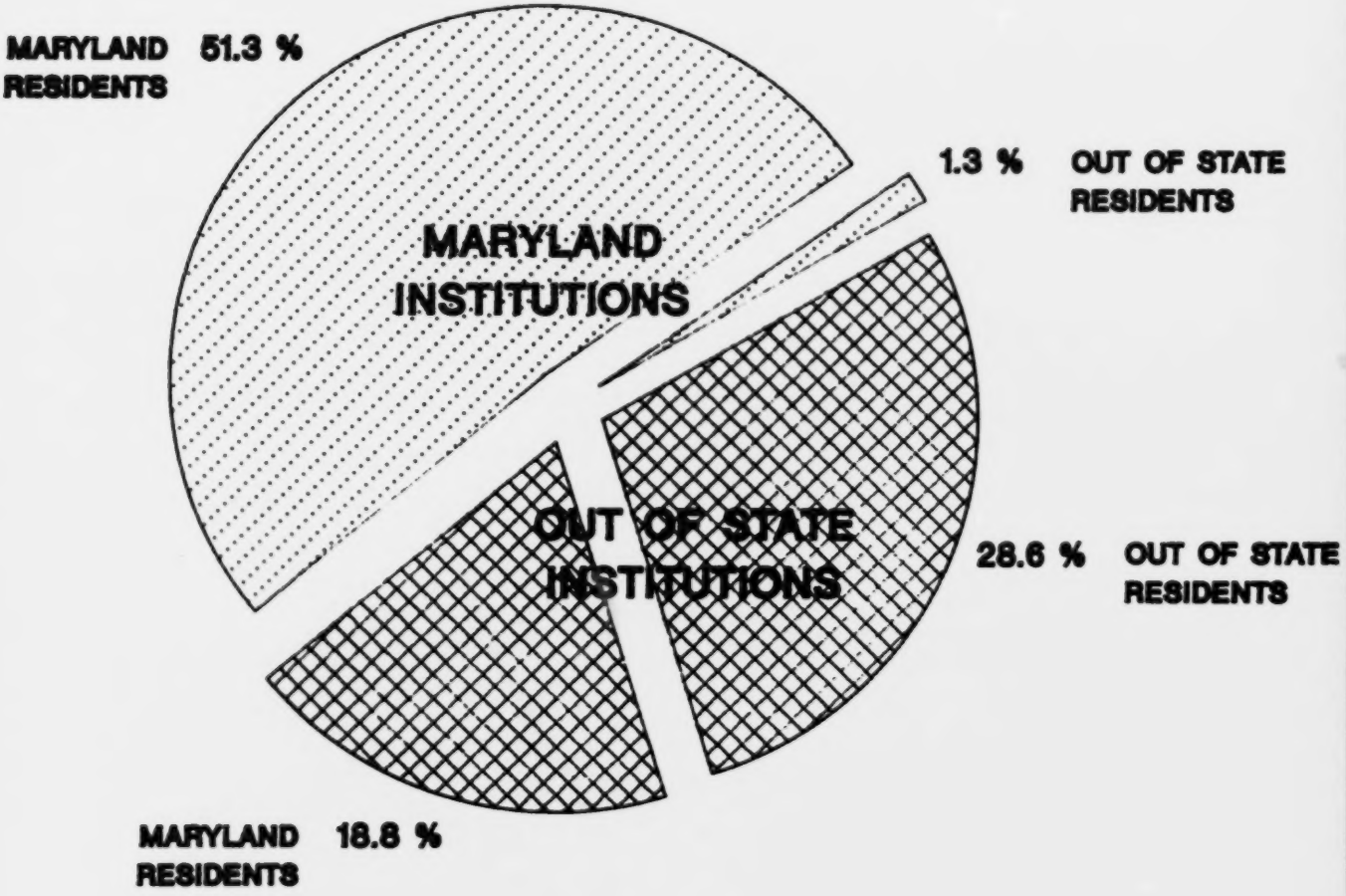
Projections are prepared year-by-year for a 10-year period from the base year.

The Florida Model includes demand projections through the year 2000. The projections are based upon estimates of enrollment, teacher-pupil ratios by course, and aggregated teacher termination rate by course. The projections are based on the number of teachers in the "base year," and that total is adjusted for terminations and for changes in enrollment. In South Carolina, teacher demand projections are based exclusively on enrollment changes. Enrollment is forecast for five years.

Each of the state models has the advantage of meeting the peculiar needs of that state. In New York and Illinois, states with shrinking enrollments, the procedures are different from those of Florida and South Carolina, states with increasing enrollments.

In Maryland, the procedures for assessing demand reflect Maryland's character as a teacher "import" state and a state with fairly large centralized administrative units in public education. Therefore, state policy-makers rely upon local school systems to collect and report data on pupil enrollment, demographic data on teachers, and a great deal of other information. In fact, the data base which currently informs Maryland State Department of Education policy includes: 1) certification status of teachers; 2) educational level of teachers (i.e., highest degree conferred); 3) race of teachers; 4) age of

PROFILE OF BEGINNING TEACHERS: 1986-87
BY INSTITUTION AND RESIDENCE


MARYLAND RESIDENTS 51.3 %
1.3 % OUT OF STATE RESIDENTS
MARYLAND INSTITUTIONS
OUT OF STATE INSTITUTIONS
28.6 % OUT OF STATE RESIDENTS
MARYLAND RESIDENTS 18.8 %

TOTAL NUMBER = 1,071

FIGURE 4

1986-87 ACTUAL VS. PROJECTED NEW TEACHERS
BY CERTIFICATION AREA

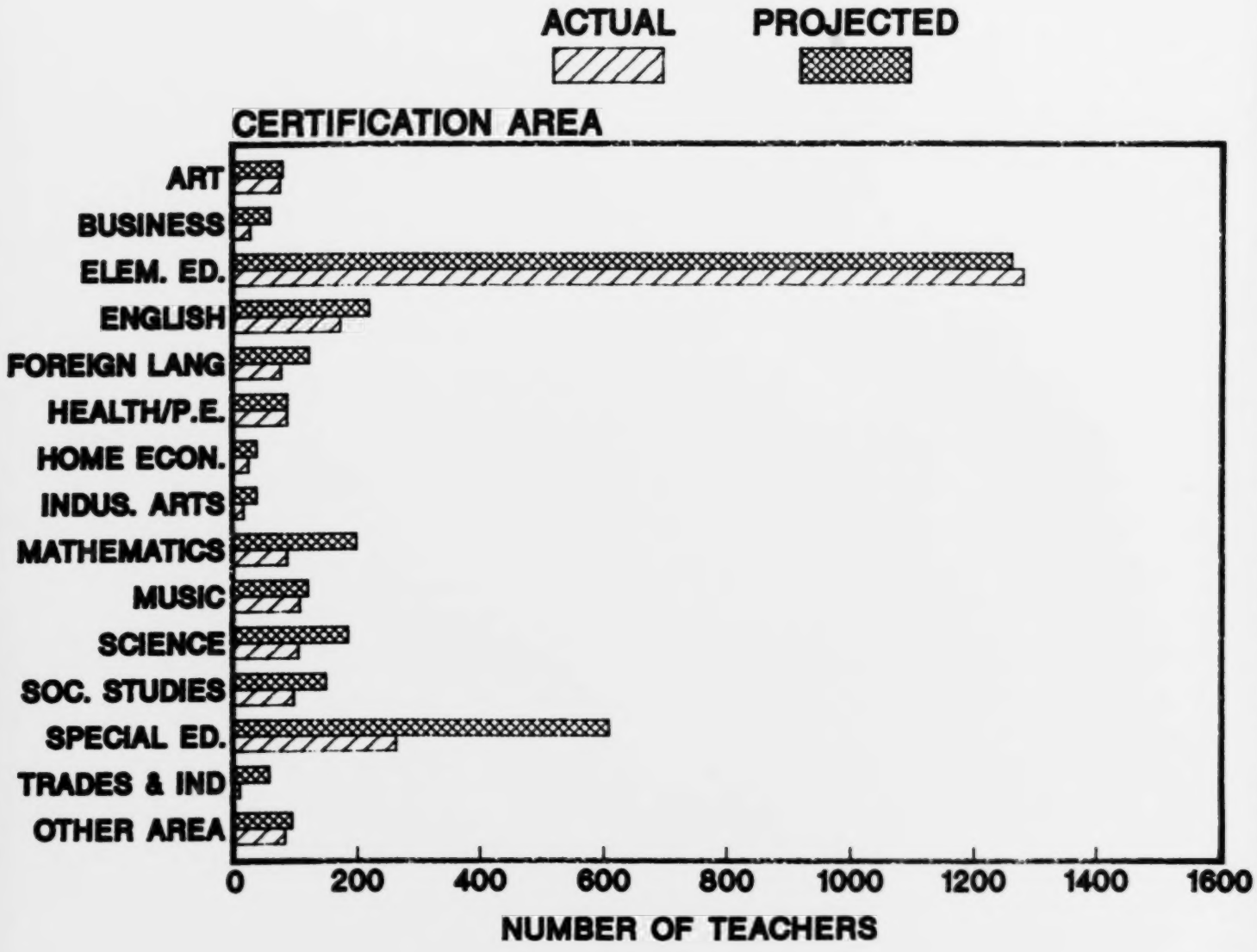


FIGURE 5

teachers, and 5) years of service (See Figures 6, 7, 8, and 9). Due to the sophistication of each school system's data base and the newly systematized reporting procedures from each local system to the State Department of Education, it is feasible for Maryland researchers to request demand data from personnel departments of local school systems and to receive data which are at least as valid and reliable as that of other states. Each local system in Maryland must keep up-to-date files of teacher data for its annual report to the State Department of Education. Therefore, personnel directors' estimates of teacher demand are not haphazard. They are based on a method which is used by local systems to collect and report data to the state for other purposes.

Summary.

In sum, the Maryland Model consists of the following steps:

(1) a request by the Maryland State Department of Education to local school systems to provide estimates of the returning teaching staff from the previous year and the number of new teachers which will be needed to fill vacancies (based on enrollment projections and teacher-student ratios for each system); this is reported by teaching field;

(2) aggregation of all estimates of vacancies which were provided by local school systems by teaching field;

(3) comparison of aggregated projections of vacancies with an aggregate of supply; supply is assessed by using 1985-86 as a base year, analyzing the four sources of supply for that year--experienced teachers in Maryland who are returning to teaching, 1987 graduates of Maryland institutions of higher education, 1987

TEACHING STAFF BY TYPE OF DEGREE
1986 - 87

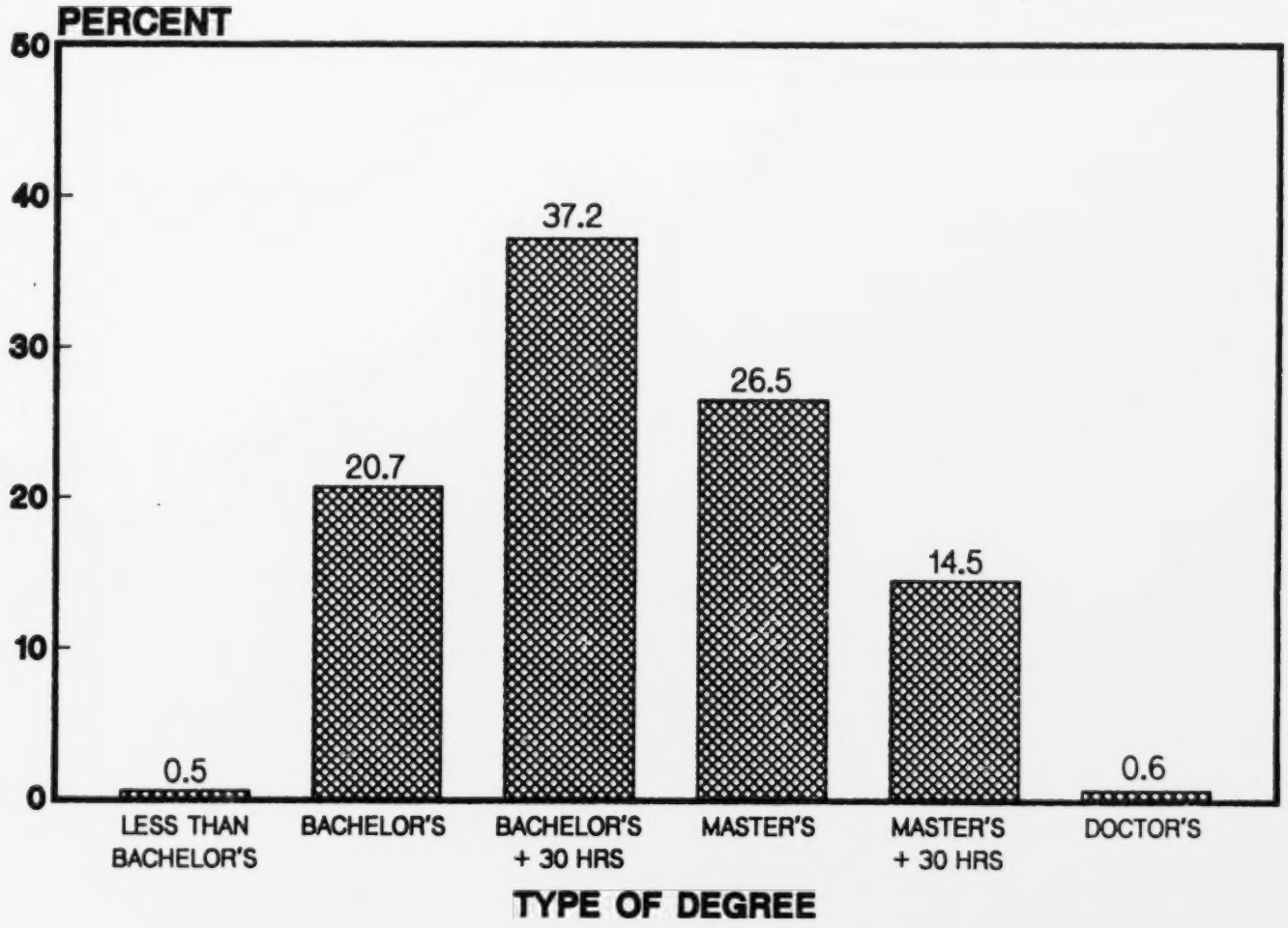


FIGURE 6

TEACHING STAFF BY TYPE OF CERTIFICATE
1986 - 87

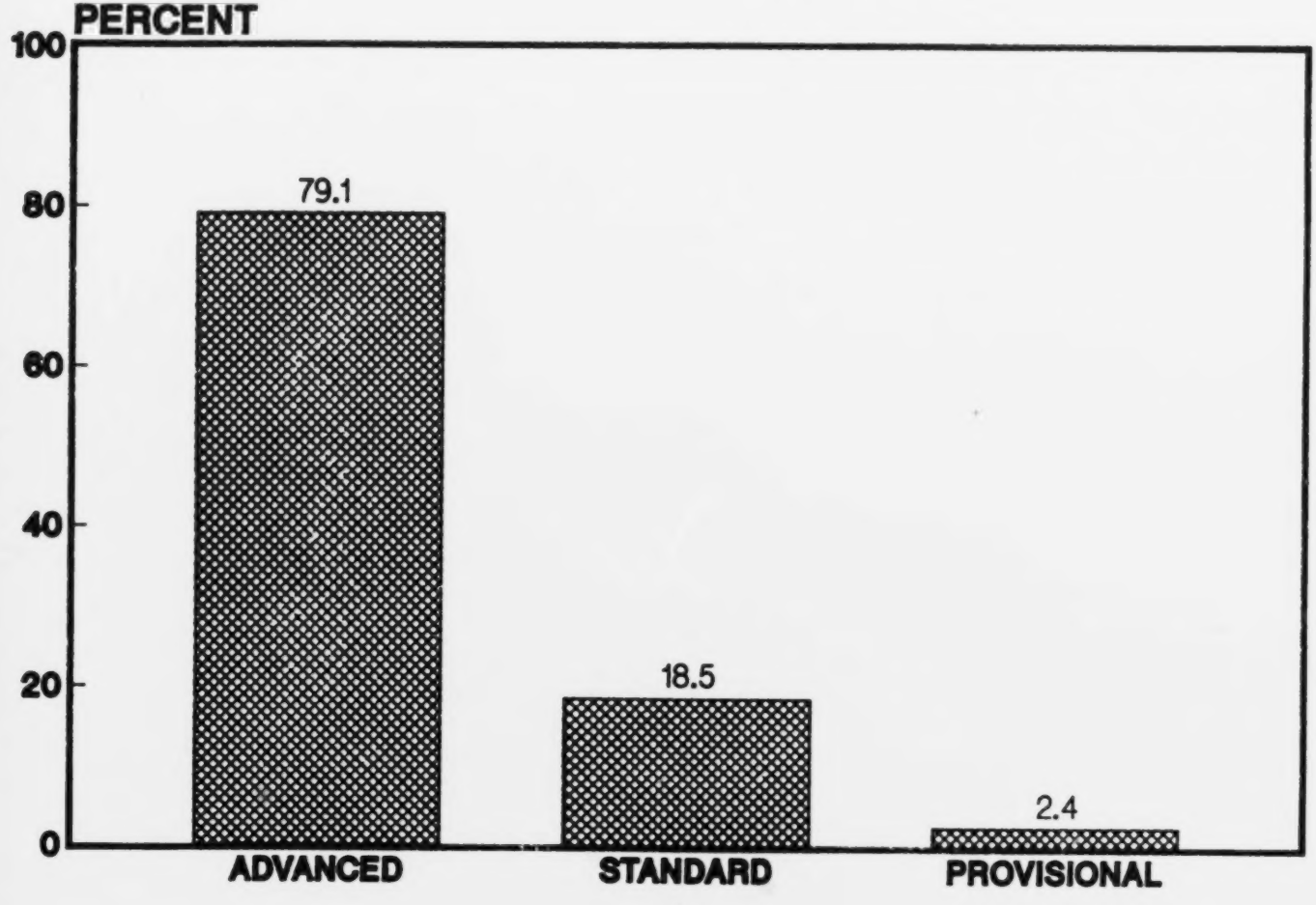


FIGURE 7

TOTAL 1986-87 TEACHING STAFF

AGE BY RACE

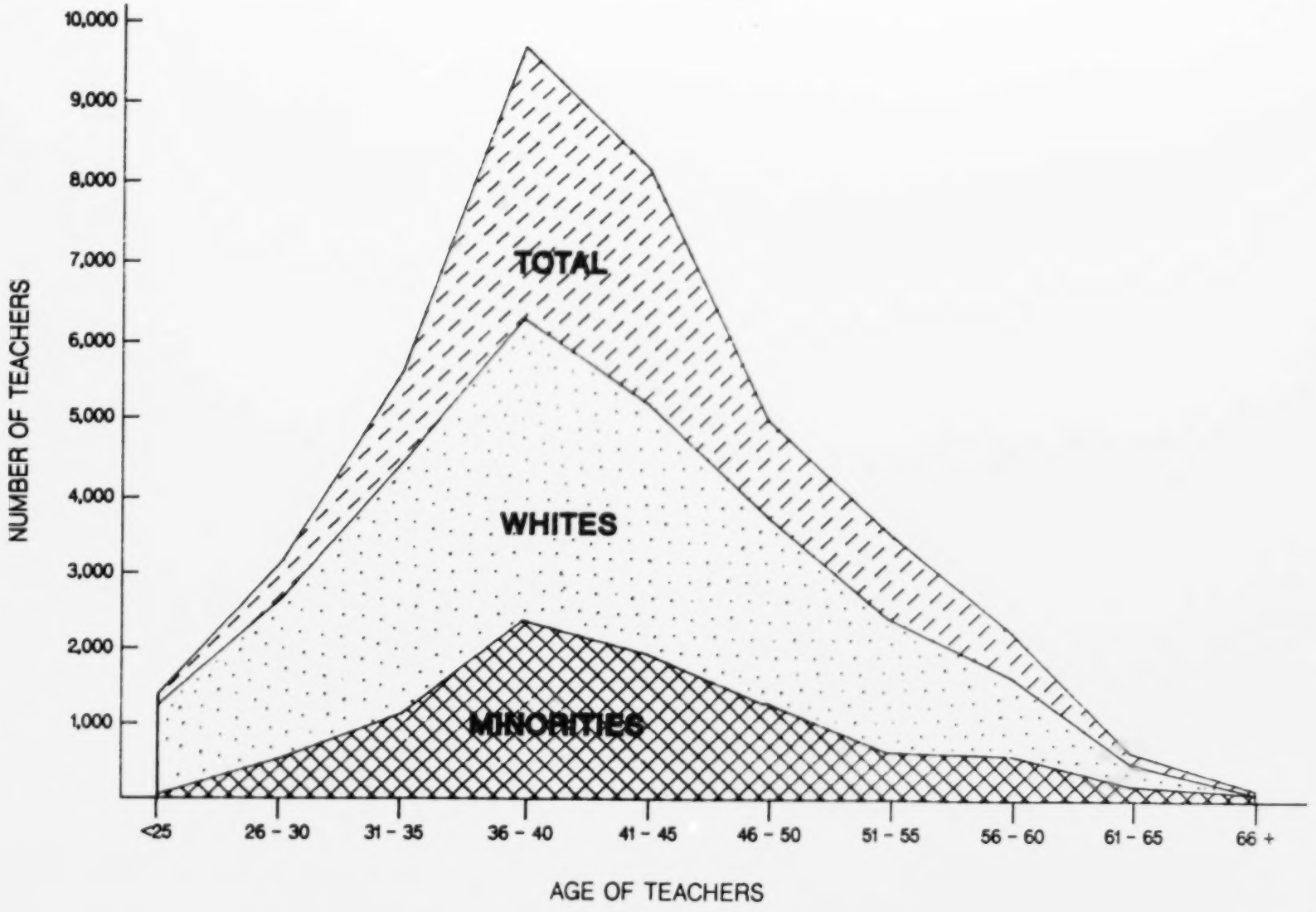


FIGURE 8

TOTAL 1986-87 TEACHING STAFF

YEARS EXPERIENCE BY RACE

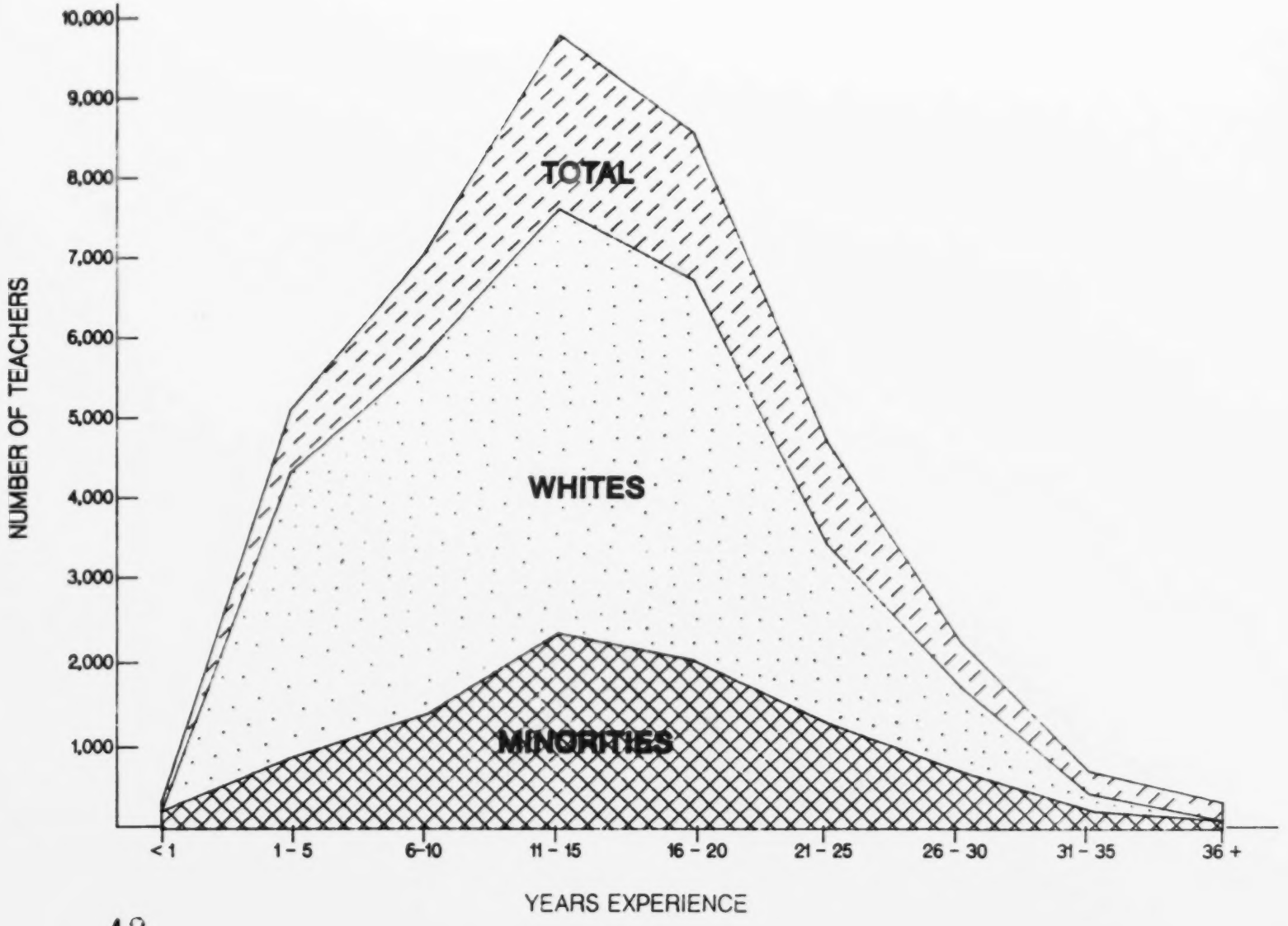


FIGURE 9

graduates of non-Maryland institutions of higher education, experienced teachers who are hired from other states, and using statistical methods of projecting supply for subsequent years (See Figure 2 for a graphic presentation of this model. Note that Figure 2 also includes "returning" staff as a source of supply).

(4) Supply and demand figures are presented to local school system officials for corroboration.

(5) Projected supply is subtracted from projected demand for each teaching field in order to identify areas of teacher shortage;

(6) Shortages in each teaching field are added together to provide a total figure for the state.

The following caveats must be noted when interpreting the data:

(1) Supply data are the result of statistical extrapolation and may therefore be insensitive to sudden changes in enrollment, hiring practices, certification regulations, or other policies and trends.

(2) Demand data are aggregates of twenty-four local school systems' attempts to report to the Maryland State Department of Education. As such, they may reflect some inconsistencies. For example, it is assumed that local systems will take attrition (e.g., retirement and resignation) into account in reporting vacancies. However, there is no standard formula by which local officials predict and report teacher attrition.

(3) One result of aggregating demand data using the state as a whole, rather than local systems, as the unit of analysis, is the limited utility of the results to local level policy-makers. For example, although Mathematics may be a teaching field which is a critical shortage area for the state as a whole, Baltimore County Public Schools may have more applicants for Mathematics teaching positions than it needs. On the other hand, although English is <u>not</u> a critical shortage area for the state as a whole, Charles County may be critically short of applicants for English vacancies.

In sum, the Maryland Model is a methodological approach to supply and demand which is tailored to the unique features of its public education system.

IV. RESULTS.

The results of this year's study are displayed on Table 5 in the Technical Supplement. According to projections which were made last year, Maryland school systems would fall short of meeting the demand for new teaching positions by about seven hundred teachers in 1986-87. That figure received a great deal of publicity in meetings around the state and in the media. This year's data reveal that Maryland school systems actually fell short of meeting the demand for new teachers by only about 550, 70% of what was projected last year. Apparently, as last year's report suggested, the very act of publicizing shortages helps to ameliorate the situation. Hopefully, this trend will continue. Note that Table 5 projects an even smaller shortfall (around 300) for 1987-88. That figure is somewhat misleading, however, because it represents an average shortfall. Therefore, while the shortage of Special Education positions is expected to be 249, that figure must be averaged in with a twenty-seven (27) position "surplus" in Elementary Education and a fifty-six (56) surplus in "other areas." A close examination of Table 5 (1987-88) reveals the greatest shortages are in Special Education (249 positions), Mathematics (75 positions), Science (61 positions), Social Studies (68 positions), and Trades and Industry (43 positions). Business Education, a critical shortage area last year, has a more favorable balance between projected demand and anticipated supply this year.

Scanning the "Supply as a % of Demand" column in Table 6 yields the following conclusions: (1) the teaching areas with the lowest percentages of projected supply are: Trades and Industry (17%), Industrial Arts (54%), Special Education (55%), Mathematics (57%), Early Childhood Education (58%), Social Studies (63%), and Science (64%). The Science percentage is misleading,

because it includes Biological Science, Chemistry, Physics, General Science, and Earth Science. In previous studies, it has been demonstrated that the balance between supply and demand of Biological Science teachers in Maryland is quite close. In fact, Maryland's institutions of higher education may produce more Biology teachers per year than its school systems can hire. Therefore, when the demand for Biological Science teachers is averaged in with the demand for teachers in the Physical Sciences, the resulting "demand" figure may appear to be somewhat lower than it actually is. In other words, although Maryland school systems are projected to be able to fill 64% of their overall Science vacancies in 1987-88, some personnel officers may only be able to fill 50% or 60% of their Physical Science vacancies.

In establishing a formula for declaring "critical shortage fields," the relationship of shortage to the total number of teachers in that teaching field is relied upon more heavily than the raw numbers for supply and demand. For example, the state will only be short by forty-three Trades and Industry teachers; however, those forty-three vacancies represent 83% of the State's total teaching force in that field. In sum, Maryland school systems are expected to fill only 17% of their Trades and Industry vacancies in 1987-88.

An encouraging result of this year's study is the finding that Maryland is better able to meet its projected demand for teachers than was expected last year. According to Tables 6, 7, and 8, the percentage of vacancies which will be filled by routine supply sources in 1987-88, 1988-89, and 1989-90 are: 92%, 94%, and 96% respectively. Overall, the trend is a positive one. Nonetheless, this year's data verify the finding in last year's report that certain teaching fields will continue to be plagued by chronic shortages

for the next few years. Special Education, Mathematics, and Science, for example, will continue to be problem areas through 1990. Early Childhood Education is projected to experience greater shortages each year between 1987-1990.

This year, in declaring a teaching field to be worthy of scholarship assistance (i.e., a "critical shortage" area), several criteria were used: (1) supply and demand trends in Maryland in the recent past; (2) supply and demand trends which are predicted for Maryland's short-term future (1987-90); (3) the size of the current Maryland teaching force in that teaching field; (4) the attrition rate of Maryland teachers in that teaching field; (5) the size of the current in-state pipeline (i.e., students who are currently enrolled in teacher education programs at Maryland institutions of higher education) in that teaching field; (6) the projected impact of new policies, regulations and population trends on the pool of Maryland teachers in that teaching field.

Given those criteria, it is recommended that the following be declared "critical shortage" areas for the 1988-89 academic year:

(1) Special Education
(2) Mathematics
(3) Physical Sciences - Physics, Chemistry, Earth Science, General Science
(4) Industrial Arts
(5) Trades and Industry

Those areas are five of the six areas which were declared last year. This year, the data do not suggest a "critical shortage" in Business Education, so it has been dropped from the list.

Early Childhood Education is not included this year because of the potentially large "reserve pool" of early childhood educators in the state. Social Studies is not included on the list because of the trend in Social Studies teaching positions over the past two decades. There has been a consistent over-supply of Social Studies teachers over the past several years; therefore, it is inadvisable to stimulate supply by providing state scholarship assistance until more data (i.e., next year's report) corroborates this finding.

V. RECOMMENDATIONS.

The recommendations which emerge from this study are of two types: (1) courses of action or policy implications which are direct results of imbalances between supply and demand; (2) courses of action which are preventive in nature, based upon trend data which appear in this report. The declaration of teaching fields of critical shortage and geographic areas of extraordinary shortage, and the recruitment initiatives which are aimed at those teaching fields and geographic regions are examples of #1. Policies and procedures which relate to the recruitment and retention of minority teachers, Early Childhood teachers, and certain educational "specialists" are examples of #2.

Although the primary objective of this report is the provision of supply and demand data to facilitate the State Board of Education's decisions about critical shortage scholarship assistance, certain staffing trends and patterns which emerged during the conduct of this study are reported as well.

This section will be divided into two subsections. The first subsection provides detailed recommendations about scholarship assistance and recruitment practices based on the findings in Section IV of this report. The second subsection will discuss "Special Issues" which may have a long term effect on teacher supply and demand in Maryland.

1. Imbalances in Supply and Demand.

Several sets of recommendations are suggested by the imbalances of teacher supply and demand which are reported in this study. One set of recommendations will address imbalances between demand and supply in specific teaching fields. The other set of recommendations will address imbalances between the race/ethnicity of the supply of new teachers in Maryland and the

race/ethnicity of pupil enrollment in Maryland's public schools. These recommendations will be treated below.

For this section of the report, the term "shortage" will be replaced by the term "imbalance" in supply and demand. Since the term "shortage" is relativistic (i.e., it is highly dependent upon the perspective of the observer).

(A). Recruitment of Non-Traditional Candidates.

In last year's report on teacher supply and demand, it was recommended (p.62) that recruitment efforts be geared toward the critical shortage areas of Special Education, Mathematics, Physical Sciences, Trades and Industry, and Industrial Arts. Those areas are still prime targets for teacher recruiters. Although all of those teaching fields are ones with which the private sector competes, they are also fields in which career changers and retirees are likely to seek second careers. For example, during the past year, state recruiters have successfully attracted a great deal of interest about teaching in Maryland among military retirees. Many of those individuals are highly trained in Mathematics, Science, Computer Science, and other technical fields, and their sense of service to society makes them ideal teacher candidates. The average age of the retiring military officer is about forty-six, so many of them still have long careers ahead of them. The strategy of attracting to Maryland schools this talented pool of teacher candidates who already hold bachelor's degrees and who are retiring from military installations in Maryland (e.g., Fort Meade, Patuxent Naval Air Station, Andrews Air Force Base) should continue to be pursued during the next few years to address shortages in Mathematics, Science, Industrial Arts and Trades and Industry. Likewise, efforts to provide alternative programs for these teacher candidates in order

to meet their special needs should be continued. Prototype programs of this type already exist in Florida, California, and Maryland (Fort Meade).

(B). Increased Collaboration among Local School Systems and between Local School Systems and the Maryland State Department of Education.

In order to address the staffing imbalances which are reported in this study, it is suggested that Maryland's school systems increase their collaborative activities on teacher recruitment -- especially for the teaching fields in which supply/demand imbalances persist. For example, Special Education, Mathematics and the Physical Sciences should be the focus of the following activities:

* Job Bank.

  The development of a statewide job bank which provides information about candidates from out-of-state who are seeking employment in critical shortage areas in Maryland;

* Advertisement.

  The advertisement of Maryland (by posters, brochures, videotapes, newspaper, T.V. and radio) as a state which is seeking qualified applicants for teaching positions in critical shortage areas;

* Future Teacher Organizations.

  The creation of a statewide network of Future Teachers of Maryland chapters in every high school for the purpose of encouraging high school students in Maryland to pursue teaching careers in their home state;

* Retiree Outreach.

The proliferation of projects such as the Retiree Outreach Project, a federally funded effort which involves Prince George's County Public Schools in collaboration with the Maryland State Department of Education to attract retiring scientists, engineers, and other technically trained retirees from government and industry to pursue second careers in Mathematics or Science teaching;

* Teacher Salaries and Incentives.

The provision of a salary and incentive structure for teachers which would counteract the "attrition of the brightest," a phenomenon which researchers such as Linda Darling-Hammond (Rand Corporation) treat with dismay. Maryland's Commission on Teacher Salaries and Incentives has been charged with responsibility for studying the problem, exploring strategies, and making recommendations to Governor Schaefer in October 1987.

(C). Cooperation with Other States and National Agencies on Data Collection Activities.

Maryland should continue to cooperate with the U.S. Office of Education, the Council of Chief State School Officers, the National Association of State Directors of Teacher Education and Certification, the National Governors' Association, and research organizations which are collecting data on teacher supply and demand.

2. Special Issues.

According to this year's data, several areas of teacher staffing will require systematic attention, and these areas are explored below.

(A). Age and Retirement Rates of Teachers.

For the past few years, national authorities on teacher supply and demand have referred to a general "greying" of the American teaching force. This trend, it is feared, will have the affect of exacerbating teacher shortages during the next decade. According to this year's figures, the Maryland teaching force, as a whole, does not seem to be "greying" rapidly, but there are certain trends which should be followed carefully. The graph on page 30 indicates that the population of minority teachers in Maryland is older than the white population. In the 1986-87 pool of returning teachers, 27.3% of the pool of white teachers is over the age of forty-five while one-third of the minority pool is over that age. Fifteen percent of the white group was over fifty years of age while twenty-one percent of the minority group was over fifty. When this trend is considered in the light of increasing minority pupil enrollments in the state and a decreasing minority "pipeline" of new teachers, it is alarming. See Table 15 in the Technical Appendix for a comparison of minority pupil enrollment and percent of minority teachers by local school systems.

Another set of factors which impinge upon supply and demand is the distribution patterns of retirees by certification area and by local jurisdiction. Among the approximately six hundred teachers who retired in 1986-87, the school system which experienced the highest percentage of teachers retiring from the system was Garrett County (5.9%). The systems with the lowest

retirement rates for that year were Worcester County, Calvert County, and Kent County school systems. See Tables 3 and 4 for retirement rates by school system and by certification area. Also, see Table 14 and Figure 11 in the Technical Supplement for causes of termination among teaching staff.

Note in Table 4 that the certification area with the greatest number of retirees in 1986-87 was Trades and Industry (3.6%), an area which was considered a teaching field of critical shortage in last year's report. The certification areas with the next highest number of retirees were Science (2%) and Mathematics (1.8%), two fields which were also critical shortage areas last year. When the high retirement rates in Trades and Industry, Science, and Mathematics are considered in the light of a "narrow" pipeline (i.e., a relatively small number of students in teacher education programs), there appears to be cause for concern.

(B). Specialists -- Need Areas Not Covered by Scholarship Legislation.

During the conduct of this study, personnel directors, state policymakers and other representatives from school systems and universities provided unsolicited information on "shortages" of certain educational specialists. Although current legislation does not provide for scholarship assistance to these groups, the importance of their function in Maryland schools makes it appropriate to consider them in the report. The three categories of specialists which seem to be in short supply are: Media Specialists, Occupational Therapists, and Physical Therapists. The Media Specialists require post-baccalaureate training to qualify for certificates in Maryland; therefore, candidates for those positions are not considered eligible for scholarship assistance under existing legislation. Since the state has not collected

TABLE 3
RETIREES BY LEA FOR 1985-86 and 1986-87

Local Unit	Number of Retiring Teachers		Percent of Teaching Staff	
	1985-86	1986-87	1985-86	1986-87
Total State	442	581	1.2%	1.5%
Allegany	13	18	2.0	2.8
Anne Arundel	35	39	1.0	1.1
Baltimore City	105	103	1.7	1.7
Baltimore	*	109	*	2.2
Calvert	0.0	1	0.0	0.2
Caroline	9	2	0.2	0.8
Carroll	4	7	0.4	0.6
Cecil	2	6	0.3	0.8
Charles	9	5	1.0	0.5
Dorchester	3	6	1.1	2.1
Frederick	16	8	1.2	0.6
Garrett	8	9	2.7	3.1
Harford	12	22	0.8	1.4
Howard	11	12	0.7	0.8
Kent	3	0	2.0	0.0
Montgomery	111	125	1.9	2.1
Prince George's	59	66	1.1	1.2
Queen Anne's	2	3	0.8	1.1
St. Mary's	3	4	0.5	0.6
Somerset	4	1	2.0	0.5
Talbot	1	3	0.4	1.3
Washington	16	16	1.6	1.6
Wicomico	11	16	1.7	2.4
Worcester	0	0	0.0	0.0

*Data not available in 1985-86

TABLE 4
RETIREES BY CERTIFICATION AREA: 1986-87

Certification Area	Number of Retiring Teachers	Percent of Teaching Staff
Total State	595	1.5%
Early Childhood	3	1.2
Art	8	0.7
Business	14	1.5
Elementary Education	213	1.5
English	42	1.6
Foreign Language	10	0.9
Health/Physical Education	23	1.0
Home Economics	14	1.8
Industrial Arts	6	0.9
Mathematics	32	1.8
Music	27	1.7
Science	41	2.0
Social Studies	48	1.9
Special Education	22	0.7
Trades and Industry	19	3.6
Other Area	67	2.1
Not Specified	6	1.3

systematic demand data on "specialists" this year, shortages cannot be forecast in this report. However, it is recommended that legislators and policy makers address this issue by collecting "demand" data in 1988 (based upon FTEs) for Educational Media Specialists, and, if the data show a need, that scholarship assistance or other incentives be provided to attract qualified applicants in those categories to Maryland school systems. Note in Table 10 that the in-state pipeline for Media Specialists is quite small. Only nine individuals graduated from programs last year and only eight are expected to graduate next year.

In the categories of Physical Therapy and Occupational Therapy, specialists are needed by school systems in order to comply with recent federal legislation -- Public Law 99-457 (The Education of the Handicapped Amendments of 1986). These specialists, according to many sources in the state, are in short supply. According to The American Occupational Therapy Association, Inc., a substantial shortage of occupational therapists exists in the United States. (AOIA Fact Sheet, 1986). The Institute for the Study of Exceptional Children and Youth corroborates the fact that a shortage of "OTs" and "PTs" exists nationwide.

Based upon preliminary shortage data which have been presented to the state by professional associations and school systems, it is recommended that state officials collect systematic data on school system demand for Occupational and Physical Therapists and that next year's (1988) report on teacher supply and demand include that information so that appropriate scholarship or other forms of assistance may be considered for qualified candidates.

(C). Early Childhood Teachers for Pre-Kindergarten Programs.

An area which may require close attention in the near future is the area of Early Childhood Education. Although Maryland institutions of higher education appear to be preparing an adequate number (208 in 1987) of early childhood teachers (Table 7) and anticipate preparing a larger number (240) in 1988, recent efforts to increase the number of pre-kindergarten programs statewide may have a significant impact on the demand for teachers who are certified in Early Childhood Education.

One recommendation which is being considered by policy makers is that there be pre-kindergarten programs in every "Chapter I" elementary school in the state. There are approximately four hundred of those schools. Only half of them have pre-kindergarten programs at present. If the state allocates funds for the remaining Chapter I schools to develop pre-kindergarten programs, the number of teachers needed to staff those programs may increase dramatically.

(D). NTE Qualifying Scores.

On July 1, 1987, the State Superintendent of Schools established NTE qualifying scores for teacher candidates who seek certification in Maryland. Before the qualifying scores were established, the performance of a group of no-fault examinees was analyzed. These examinees were required to take the NTE but were not required to meet a qualifying score. The fourteen month "no-fault" period extended from April 21, 1986 to July 1, 1987. The qualifying scores which were established were based upon three data sources: (1) the no-fault examinees' distribution of scores, (2) the recommendations of Maryland's "Knowledge Estimation Panel" during the validation study which preceded the

NTE no-fault period, and (3) the NTE qualifying scores which are currently being used by other states. A report which provides a detailed explanation of the establishment of NTE qualifying scores was published in June 1987 by the Maryland State Department of Education. That report is cited in the Reference page of this report. According to the data which are displayed in Table 10 (Technical Supplement), a high percentage of the no-fault examinees met the qualifying scores which were established. However, in Mathematics, a critical shortage area in Maryland for the past two years, fewer than 79.8% of the no-fault examinees would have qualified.

Another area of concern which is related to the NTE is the impact of the qualifying score on black examinees. In other states, (e.g., Virginia, Texas) which have implemented statewide teacher testing programs, the impact on minority test-takers has been significant. Figure 10 (Technical Supplement), indicates that the percentages of black examinees who took the NTE Core Battery during the no-fault period and who would have met the subsequently established qualifying scores were only 48.6% (Communication Skills), 44.3% (General Knowledge), and 55.5% (Professional Knowledge) as compared to white examinees' anticipated passing rates of 94.2%, 94.8%, and 94.4% on these tests. Unless immediate action is taken to address this discrepancy, it is possible that the relatively small representation of minority teachers in Maryland schools will be diminished by two factors: (1) the inability of minority examinees to meet the NTE qualifying scores and (2) unwillingness of minority college students to enter teacher preparation programs which culminate in their "failure" on the NTE. It is important to remember that the

analysis of minority performance on the Core Battery during the no-fault period is based upon a relatively small number of minority examinees. On Specialty Area tests, there were insufficient minority examinees to report performance data by race. Nonetheless, the results were suggestive.

(E). The Recruitment of Minority Candidates.

One of the imbalances in supply and demand which was not directly highlighted in the previous section is the imbalance between the percentage of minority pupil enrollment and the percentage of the minority teaching staff in some of Maryland's school systems. According to Table 15, there are several school systems in the state which have large discrepancies between those two percentages. If one accepts the theory that many minority youngsters perform better when there are same-race, "role models" among the teachers in a school, then it is important to address this imbalance.

According to recent data collection efforts by state agencies and national organizations, minority college students are not entering teacher education. Last year, only about 11% of the graduates of Maryland teacher education programs were non-white (See Table 11). Approximately 16% of the new teachers hired in Maryland during 1986-87 was non-white. This is compared with the fact that approximately 25% of the overall professional staff in Maryland is non-white and that one-third of the pupil enrollment in the state is non-white. Demographers predict that that proportion of non-white pupil enrollment in Maryland schools is on the increase.

This situation must be considered in the light of other trends which were discussed in this report, such as: (1) the higher rate of retirement of black teachers than white teachers in the state; (2) the lower passing rates

of black NTE examinees, and (3) the rapid aging of Maryland's minority teaching force.

Several courses of action are suggested by this: (1) the provision of special tuition remission/scholarship plans for minority students in teacher education; (2) collaboration among school systems, institutions of higher education, the Maryland State Department of Education, and professional associations to recruit minorities into teaching. A Maryland State Department of Education Task Force on Recruiting Minorities is exploring strategies for enhancing the pool of minority applicants. Its charge is to examine factors which are related to the recruitment of minority professionals to Maryland schools and to develop a "state plan of action" for addressing the problem.

CONCLUSION

The demand for teachers to staff Maryland schools continues to rise. According to last year's report on teacher supply and demand, the state would need 3640 teachers in 1988-89. This year, however, the data from school system personnel directors raises that estimate upward to 3722 and to 3886 in 1989-90. The steady increase in demand may be considered an indicator of the growth of the teacher "market" in Maryland. However, rising demand must be addressed by vigorous attempts to stimulate supply sources within and outside of the state.

This year's data reflect an increase in supply as well as demand. Hopefully, that increase is a long term trend which has resulted from efforts of state and local education officials to avert predicted shortages. If so, those officials should continue their aggressive programs to recruit teachers, increase teacher salaries, and provide incentives for talented candidates to enter the teaching profession. On the other hand, if the apparent increase in supply reflects a short term reaction to predictions of shortages, state and local officials should explore long term solutions to the fluctuations of supply and demand so that sufficient numbers of qualified candidates are available to meet Maryland's long term need for qualified teaching personnel.

Special attention should be given to ameliorating the shortages which are identified in this report: Mathematics, the Physical Sciences, Special Education, Industrial Arts, and Trades and Industry. The recruitment of minority teachers should be considered high priority for the next three years.

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TECHNICAL SUPPLEMENT

TABLE 5
NEW TEACHERS HIRED BY CERTIFICATION AREA: 1986-87

Certification Area	Beginning Teachers			Experienced Teachers			Total MD		Total Non-MD		Grand Total
	MD IHE	Non-MD IHE	Total	MD	Non-MD	Total	N	%	N	%	
Total	564	507	1,071	839	812	1,651	1,403	52%	1,319	48%	2,722
Early Childhood	8	1	9	24	8	32	32	78	9	22	41
Art	25	7	32	25	17	42	50	68	24	32	74
Business	3	12	15	5	6	11	8	31	18	69	26
Elementary Ed.	274	229	503	403	332	735	677	55	561	45	1,238
English	37	29	66	52	53	105	89	52	82	48	171
Foreign Language	13	11	24	18	34	52	31	41	45	59	76
Health/Phys. Ed.	26	15	41	26	19	45	52	60	34	40	86
Home Economics	1	3	4	11	8	19	12	52	11	48	22
Industrial Arts	1	8	9	0	6	6	1	7	14	93	15
Mathematics	17	11	28	25	33	58	42	49	44	51	86
Music	16	20	36	38	32	70	54	51	52	49	106
Science	27	29	56	27	21	48	54	52	50	48	104
Social Studies	15	25	40	23	33	56	38	40	58	60	96
Special Ed.	36	57	93	69	101	170	105	40	158	60	263
Trades/Industry	1	1	2	5	1	6	6	75	2	25	8
Other Areas	11	1	12	51	19	70	62	76	20	24	82
Not Specified	53	48	101	37	89	126	90	40	137	60	227

TABLE 6
SUPPLY AND DEMAND PROJECTIONS: 1987-88

Certification Area	Returning From 1986-87	Beginning Teachers		Experienced Teachers		SUPPLY Total New Hired	Total Supply	DEMAND New Hires	Supply Minus Demand	Supply as % of Demand	Error of Percent Estimate
		MD	Non-MD	MD	Non-MD						
Total	36,721	549	578	1,007	976	3,110	39,831	3,399	-289	92%	±1%
Early Childhood	213	8	9	15	15	47	260	81	-34	58	±11
Art	1,027	15	16	27	26	84	1,111	82	+2	102	±3
Business	897	5	6	10	10	31	928	41	-10	76	±13
Elementary Ed.	13,363	250	263	458	444	1,415	14,778	1,388	+27	102	±1
English	2,428	35	36	63	62	196	2,624	226	-30	87	±4
Foreign Language	995	15	16	29	27	87	1,082	98	-11	89	±6
Health/Phys. Ed.	2,287	18	19	32	31	100	2,387	89	+11	112	±8
Home Economics	736	4	5	8	8	25	761	35	-10	71	±15
Industrial Arts	658	3	4	6	6	19	677	35	-16	54	±16
Mathematics	1,695	18	19	32	31	100	1,795	175	-75	57	±7
Music	1,477	21	23	39	38	121	1,598	149	-28	81	±6
Science	1,975	21	22	38	37	118	2,093	184	-66	64	±7
Social Studies	2,376	19	20	36	34	109	2,485	177	-68	62	±7
Special Ed.	2,730	53	56	98	95	302	3,032	551	-249	55	±1
Trades/Industry	521	2	2	3	2	9	530	52	-43	17	±10
Other Area	3,109	16	17	30	29	92	3,201	36	+56	256	-
Not Specified	234	46	45	83	81	255	489	-	-	-	

-T.S.1b-

TABLE 7
SUPPLY AND DEMAND PROJECTIONS: 1988-89

Certification Area	Returning From 1987-88	Beginning Teachers		Experienced Teachers		SUPPLY Total New Hired	Total Supply	DEMAND New Hires	Supply Minus Demand	Supply as % of Demand	Error of Percent Estimate
		MD	Non-MD	MD	Non-MD						
Total	37,361	620	653	1,130	1,096	3,499	40,860	3,722	-223	94%	±1%
Early Childhood	560	9	10	17	16	52	612	105	-53	49	±9
Art	1,009	17	18	31	29	95	1,104	87	+8	109	±7
Business	374	6	7	11	11	35	409	46	-11	76	±12
Elementary Ed.	16,999	282	297	514	499	1,592	18,591	1,527	+65	104	±1
English	2,354	39	41	71	69	220	2,574	237	-17	93	±10
Foreign Language	1,046	17	18	32	31	98	1,144	103	-5	95	±13
Health/Phys. Ed.	1,196	20	21	36	35	112	1,308	105	+7	107	±5
Home Economics	299	5	5	9	9	28	327	38	-10	74	±14
Industrial Arts	224	4	4	7	6	21	245	50	-29	42	±14
Mathematics	1,196	20	21	36	35	112	1,308	192	-80	58	±7
Music	1,457	24	25	44	43	136	1,593	171	-35	80	±6
Science	1,420	24	25	43	41	133	1,553	216	-83	62	±6
Social Studies	1,308	22	23	40	37	122	1,430	196	-743	62	±6
Special Ed.	3,624	60	63	110	106	339	3,963	562	-223	60	±4
Trades/Industry	112	2	2	4	3	11	123	52	-41	21	±11
Other Area	1,121	19	20	34	32	105	1,226	35	+70	300	-
Not Specified	3,062	50	53	91	94	288	3,350	-	-	-	-

TABLE 8
SUPPLY AND DEMAND PROJECTIONS: 1989-90

Certification Area	Returning From 1988-89	Beginning Teachers		Experienced Teachers		SUPPLY Total New Hired	Total Supply	DEMAND New Hires	Supply Minus Demand	Supply as % of Demand	Error of Percent Estimate
		MD	Non-MD	MD	Non-MD						
Total	38,326	678	714	1,267	1,227	3,886	42,212	4,030	-144	96%	±2%
Early Childhood	575	10	11	19	18	58	633	127	-69	46	±9
Art	1,035	18	19	34	34	105	1,140	101	+4	104	±4
Business	383	7	7	13	12	39	422	51	-12	76	±12
Elementary Ed.	17,438	309	325	576	558	1,768	19,206	1,655	+113	107	±1
English	2,415	43	45	80	77	245	2,660	262	-17	94	±9
Foreign Language	1,073	19	20	36	34	109	1,182	107	+2	102	±3
Health/Phys. Ed.	1,226	22	23	41	38	124	1,350	120	+4	103	±3
Home Economics	307	5	6	10	10	31	338	38	-7	82	±12
Industrial Arts	230	4	4	8	7	23	253	54	-31	43	±13
Mathematics	1,226	22	23	40	39	124	1,350	201	-77	62	±7
Music	1,495	26	28	50	48	152	1,647	190	-38	80	±6
Science	1,456	26	27	48	47	148	1,604	229	-81	65	±6
Social Studies	1,341	24	25	44	43	136	1,477	216	-80	63	±6
Special Ed.	3,718	66	69	123	119	377	4,095	589	-212	64	±4
Trades/Industry	115	2	2	4	4	12	127	54	-42	22	±11
Other Area	1,150	20	21	39	37	117	1,269	36	+81	325	-
Not Specified	3,143	55	59	102	102	318	3,461	-	-	-	-

-T.S.1d-

TABLE 9
ANTICIPATED DEMAND FOR NEW TEACHERS: 1987-1990

Teaching Field	School Year 1987-88	1988-89	1989-90	3-Year Total
Total	3,461	3,786	4,101	11,348
Early Childhood	81	105	127	313
Grades K-6	1,388	1,527	1,655	4,570
Total 0-6	1,469	1,632	1,782	4,883
Art K-6	45	45	54	144
Art 7-12	37	42	47	126
Total Art	82	87	101	270
English	221	232	257	710
Journalism	3	3	3	9
Speech and Drama	2	2	2	6
Total English Language	226	237	262	725
French	34	32	36	102
German	5	5	4	14
Latin	8	10	10	28
Russian	0	0	0	0
Spanish	35	39	40	114
Other Foreign Languages	16	17	17	50
Total Foreign Languages	98	103	107	308
Health	16	17	19	52
Home Economics	35	38	38	111
Industrial Arts	35	50	54	139
Mathematics	175	192	201	568
Media Specialist	62	64	71	197
Music-General - K-6	60	68	73	201
Music-General - 7-12	37	41	43	121
Music-Inst - K-6	10	12	13	35
Music-Inst - 7-12	15	16	22	53
Music-Vocal - K-6	15	21	21	57
Music-Vocal - 7-12	12	13	18	43
Total Music	149	171	190	510
Outdoor Education	2	0	0	2
Physical Education - K-6	40	52	59	151
Physical Education - 7-12	33	36	42	111
Total Physical Education	73	88	101	262

TABLE 9 (Continued)
ANTICIPATED DEMAND FOR NEW TEACHERS: 1987-1990

Teaching Field	School Year 1987-88	1988-89	1989-90	3-Year Total
Biology	33	48	48	129
Chemistry	19	26	24	69
Earth Science	23	22	25	70
General Science	51	58	65	174
Physics	15	19	23	57
Other Science	43	43	44	130
Total Science	184	216	229	629
Special Education 0-3	69	70	79	218
Special Education 1-8	233	226	231	690
Special Education 6-12	180	186	197	563
Hearing Impaired	15	19	19	53
Severely Handicapped	42	49	52	143
Visually Handicapped	12	12	11	35
Total Special Education	551	562	589	1,702
Economics	12	14	14	40
Geography	5	5	6	16
History	26	29	32	87
Psychology	7	10	8	25
Social Studies	79	90	107	276
Sociology	0	0	1	1
Other Social Science	48	48	48	144
Total Social Science	177	196	216	589
Agriculture	6	7	7	20
Business Education	41	46	51	138
Distributive Education	5	5	5	15
Trade and Industry	52	52	54	158
Other Voc-Tech	23	23	24	70
Total Voc-Tech	127	133	141	401

Source: LEA Directors of Personnel

TABLE 10
SUPPLY OF NEW TEACHERS
GRADUATES OF MARYLAND'S TEACHER EDUCATION PROGRAMS: 1987-88

Teaching Field	Actual 1987	Anticipated 1988
Total	1,262	1,423
Early Childhood	208	240
Elementary Education	443	505
Total Nursery-6	651	745
Art K-6	0	0
Art 7-12	5	7
Art K-12	44	47
Total Art	49	54
English	68	70
Journalism	0	0
Speech and Drama	7	6
Total English Language	75	76
French	8	11
German	0	0
Latin	0	0
Russian	0	0
Spanish	15	22
Other Foreign Languages	0	2
Total Foreign Languages	23	35
Health	12	12
Home Economics	11	9
Industrial Arts	5	5
Mathematics	39	54
Music-General - K-6	0	0
Music-General - 7-12	0	0
Music-General - K-12	17	9
Music-Inst - K-6	0	0
Music-Inst - 7-12	1	0
Music-Inst - K-12	24	26
Music-Vocal - K-6	2	7
Music-Vocal - 7-12	1	0
Music-Vocal - K-12	11	10
Total Music	56	52
Outdoor Education	3	2

TABLE 10 (Continued)
SUPPLY OF NEW TEACHERS
GRADUATES OF MARYLAND'S TEACHER EDUCATION PROGRAMS: 1987-88

Teaching Field	Actual 1987	Anticipated 1988
Physical Education - K-6	26	30
Physical Education - 7-12	6	15
Physical Education - K-12	28	30
Total Physical Education	60	75
Biology	41	45
Chemistry	6	6
Earth Science	2	2
General Science	7	15
Other Science	2	2
Total Science	58	70
Economics	0	0
Geography	0	0
History	15	12
Psychology	0	0
Social Studies	52	72
Sociology	0	0
Other Social Science	1	0
Total Social Science	68	84
Agriculture	4	4
Business Education	11	21
Distributive Education	0	1
Trade and Industry	2	1
Other Voc-Tech	5	4
Total Voc-Tech	22	31
Education Media	9	8
Special Education 0-3	22	25
Special Education 1-8	23	16
Special Education 6-12	39	34
Hearing Impaired	0	0
Severely Handicapped	8	5
Visually Impaired	0	0
Total Special Education	92	80
All Other	29	31

Source: Deans and Directors, Maryland Institutions of Higher Education

TABLE 11
SUPPLY OF MARYLAND TEACHER EDUCATION GRADUATES BY RACE: 1987

Certification Area	Minority	Total	% Minority
Total	145	1,253	11.7%
Early Childhood	22	208	10.6
Elementary Education	42	443	9.5
Art	3	49	6.1
English Language Arts	2	75	2.7
Foreign Languages	2	23	8.7
Health	1	12	8.3
Home Economics	1	11	9.1
Industrial Arts	4	5	80.0
Mathematics	4	39	10.3
Music	6	56	10.7
Outdoor Education	0	3	.0
Physical Education	8	60	13.3
Science Education	2	58	3.4
Social Sciences	4	68	5.9
Voc-Tech	4	22	18.2
Special Education	38	92	41.3
All Other	3	29	10.3

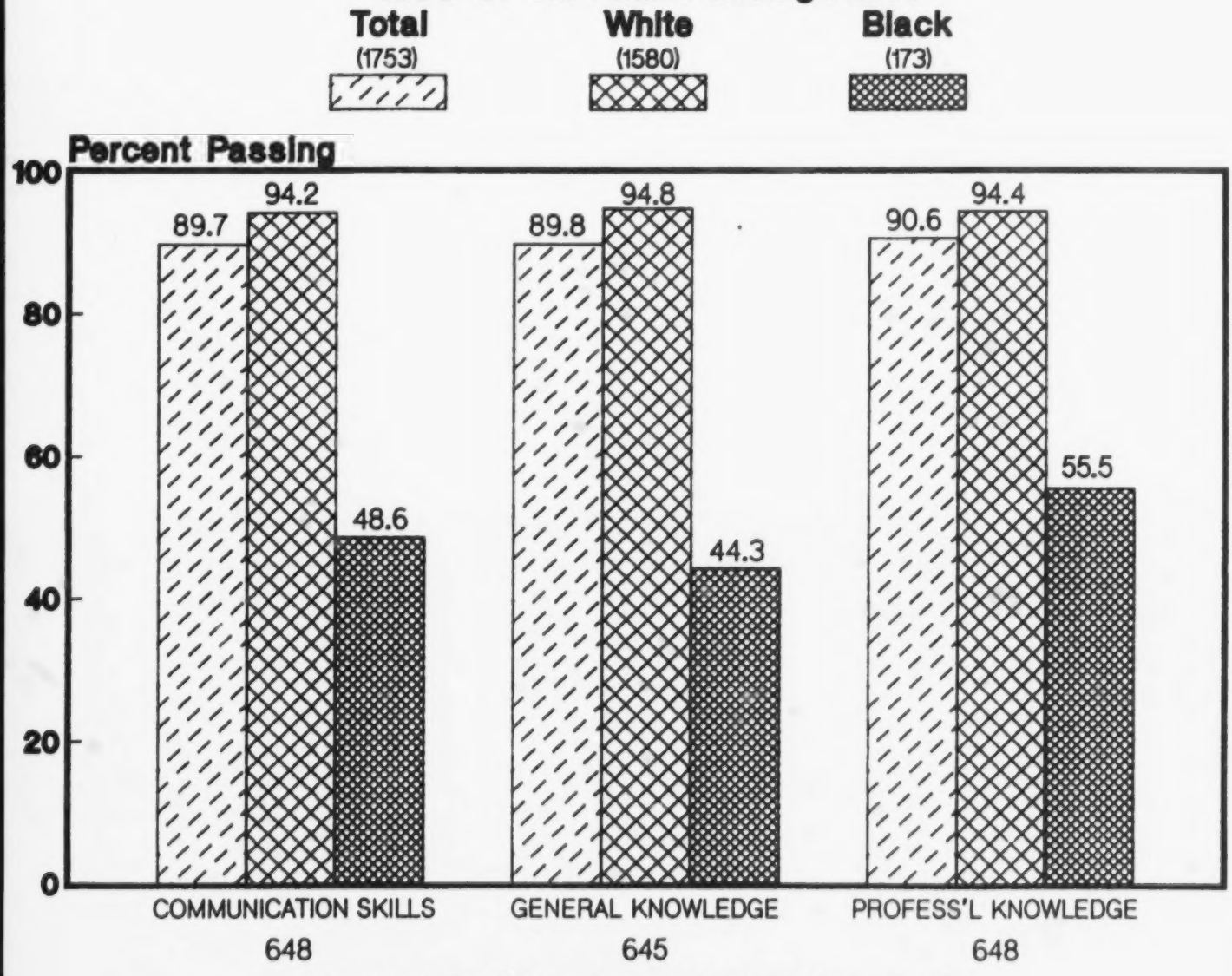
Source: Deans and Directors, Maryland Institutions of Higher Education

TABLE 12
TEACHER SALARIES FOR 1986-87 AND 1987-88

Local Unit	Bachelor's Degree 1986-87	1987-88	Percent Change
Allegany	15,849	16,958	7.00%
Anne Arundel	16,809	18,800	11.84
Baltimore City	17,000	18,000	5.88
Baltimore	17,500	21,000	20.00
Calvert	20,000	21,400	7.00
Caroline	17,000	19,000	11.76
Carroll	18,133	20,000	10.30
Cecil	17,100	19,450	13.74
Charles	18,000	19,420	7.89
Dorchester	17,000	19,010	11.82
Frederick	17,850	19,500	9.24
Garrett	15,939	16,895	6.00
Harford	17,100	19,000	11.11
Howard	19,100	20,650	8.12
Kent	15,441	16,754	8.50
Montgomery	19,000	22,000	15.79
Prince George's	19,000	21,000	10.53
Queen Anne's	22,000	23,500	6.82
St. Mary's	18,000	19,260	7.00
Somerset	17,000	18,000	5.88
Talbot	17,973	19,950	11.00
Washington	18,000	19,260	7.00
Wicomico	17,500	19,000	8.57
Worcester	19,284	20,412	5.85
Average % Increase			9.50%

NTE CORE BATTERY TESTS

1986-87 No Fault Passing Rates



Maryland Qualifying Scores for NTE Core Battery

FIGURE #10

TABLE 13
NTE QUALIFYING SCORES FOR MARYLAND

	Qualifying Score	Number of Examinees	Percent Passing
CORE BATTERY			
Communication Skills	648	1753	89.7
General Knowledge	645	1753	89.8
Professional Knowledge	648	1755	90.6
SPECIALTY AREA			
Art	510	60	91.7
Biology and General Science	570	75	90.7
Business Education	540	23	95.7
Chemistry, Physics, General Science	520	41	90.2
Early Childhood Education	520	293	95.9
Elementary Education	550	660	90.0
English Language and Literature	500	152	90.1
French	510	27	92.6
German	510	3	**
Home Economics Education	520	22	95.5
Industrial Arts Education	550	12	100.0
Library Media Specialist	540	23	95.7
Mathematics	520	114	79.8
Music	530	79	89.9
Physical Education	580	65	89.2
Social Studies	530	97	90.7
Spanish	500	32	93.8
Special Education	500	235	90.2
Speech Communication	500	3	**

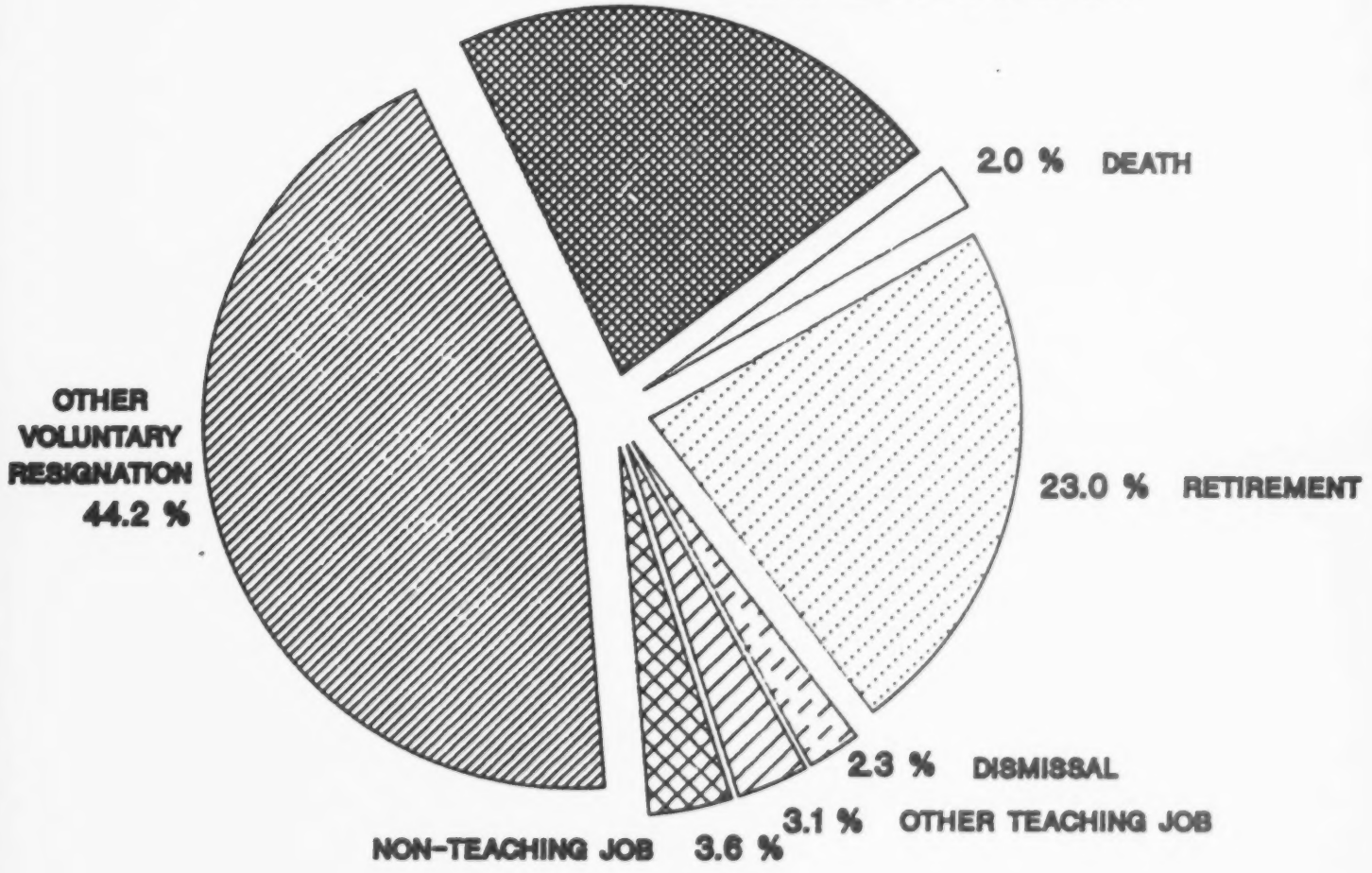
**Percent passing is not computed for tests with fewer than 10 examinees.

TABLE 14
TERMINATION CAUSE BY CERTIFICATION AREA: 1986-87

Certification Area	Death	Retirement	Dismissed by Local	TEACHING				OTHER WORK		Voluntary Resignation	Leave of Absence	Total		Transferred to Another LEA
				Other Country	Other State	MD IHE	Non-Public School	Gov't.	Business			N	%	
Total	51	581	59	13	46	3	7	4	82	1,116	552	2,527	100.0%	77
Percent	1.9%	23.2	2.2	.6	2.0	.2	.3	.2	3.6	43.0	22.8			
Early Childhood	1	3	-	-	1	-	-	-	-	8	3	16	.7	1
Art	-	8	-	-	0	-	-	-	1	21	17	47	1.9	1
Business	3	14	1	-	-	-	-	-	3	15	6	42	1.7	0
Elementary Ed.	11	208	7	6	11	1	4	3	16	416	233	916	37.5	33
English	5	42	5	-	1	1	-	-	8	83	41	186	7.6	6
Foreign Language	2	10	3	1	1	-	1	1	2	46	17	84	3.5	1
Health/Phys. Ed.	3	22	4	0	1	-	-	-	7	29	17	83	3.4	0
Home Economics		14	4	0	2	-	-	-	-	19	11	50	2.0	3
Industrial Arts	2	6	8	-	-	-	-	-	6	10	5	37	1.5	1
Mathematics	1	30	3	1	2	-	1	-	7	41	13	99	4.1	4
Music	1	26	0	-	2	-	1	-	1	39	21	91	3.7	3
Science	3	41	2	1	3	-	-	-	2	73	24	149	6.0	4
Social Studies	6	46	4	-	0	0	-	0	8	54	25	143	5.9	4
Special Education	3	22	7	3	15	1	-	-	7	135	69	262	10.7	9
Trades/Industry	3	18	4	1	-	-	-	-	9	12	5	52	2.2	1
Other Area	5	65	1	0	3	-	-	-	5	65	41	185	7.6	6
Not Specified	2	6	6	-	4	-	-	-	5	58	4	85	-	-

CAUSES OF TERMINATION
AMONG TEACHING STAFF

1966 - 67


21.8 % LEAVE OF ABSENCE
2.0 % DEATH
23.0 % RETIREMENT
2.3 % DISMISSAL
3.1 % OTHER TEACHING JOB
3.6 % NON-TEACHING JOB
OTHER VOLUNTARY RESIGNATION 44.2 %

TOTAL = 2,527 (Excludes LEA Transfers)

FIGURE #11

TABLE 15
NUMBER AND PERCENT OF STUDENTS AND TEACHERS BY RACE
MARYLAND PUBLIC SCHOOLS: 1986-87

Local Unit	Students				Teachers			
	Total	White	Nonwhite	Percent Nonwhite	Total	White	Nonwhite	Percent Nonwhite
Total State	674,274	426,159	248,115	36.8%	39,443	30,373	9,070	23.0%
Allegany	11,554	11,271	283	2.5	644	642	2	0.3
Anne Arundel	63,926	53,361	10,565	16.5	3,621	3,089	532	14.7
Baltimore City	111,292	21,185	90,107	81.0	6,139	1,832	4,307	70.2
Baltimore	80,328	65,558	14,770	18.4	5,069	4,638	431	8.5
Calvert	8,495	6,467	2,028	23.9	442	337	105	23.7
Caroline	4,392	3,351	1,041	23.7	257	214	43	16.9
Carroll	20,113	19,550	563	2.8	1,092	1,066	26	2.4
Cecil	12,161	11,476	685	5.6	722	696	26	3.6
Charles	16,972	12,964	4,008	23.6	921	699	222	24.1
Dorchester	4,970	2,915	2,055	41.3	289	227	62	21.5
Frederick	24,575	22,796	1,779	7.2	1,391	1,329	62	4.5
Garrett	5,086	5,070	16	0.3	287	286	1	0.3
Harford	27,611	23,828	3,783	13.7	1,588	1,480	108	6.8
Howard	25,640	20,813	4,827	18.8	1,579	1,360	219	13.9
Kent	2,356	1,715	641	27.2	148	120	28	18.9
Montgomery	94,460	64,660	29,800	31.6	6,052	5,314	738	12.2
Prince George's	102,530	33,567	68,963	67.3	5,731	4,039	1,692	29.5
Queen Anne's	4,824	4,048	776	16.1	265	222	43	16.2
St. Mary's	11,596	9,151	2,445	21.1	723	615	108	14.9
Somerset	3,574	1,952	1,622	45.5	210	138	72	34.3
Talbot	3,784	2,670	1,114	29.4	232	188	44	19.0
Washington	17,271	16,479	792	4.6	1,019	997	22	2.2
Wicomico	11,620	7,922	3,698	31.8	673	566	107	15.9
Worcester	5,144	3,390	1,754	34.1	349	279	70	20.1